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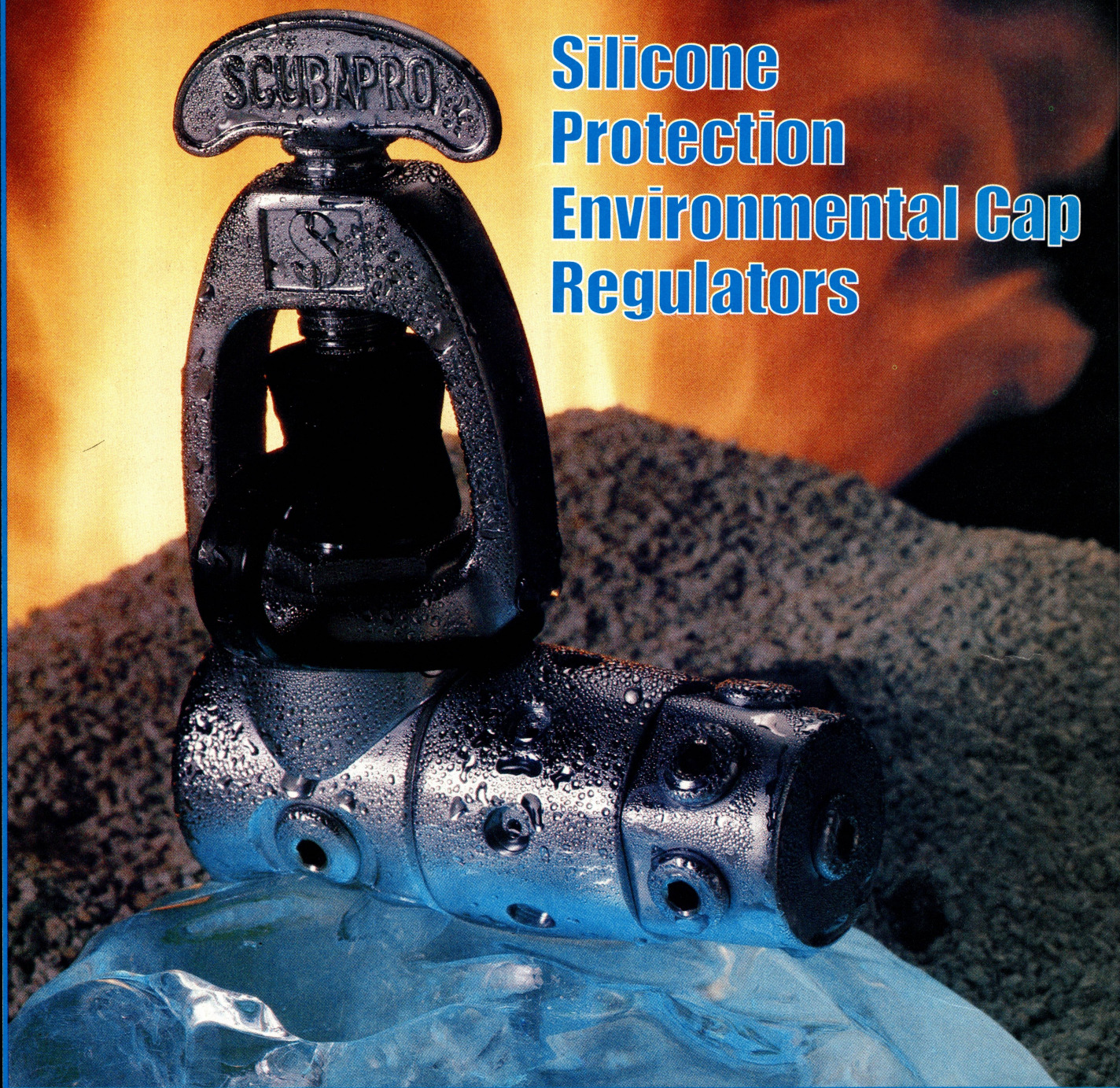


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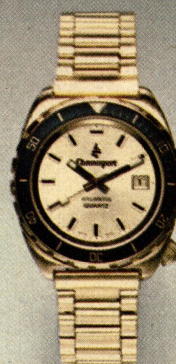
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skin diver

Volume Thirty Number Eight

PHOTOGRAPHY

FEATURES

11

HOW TO WIN A PHOTO CONTEST

AL HORNSBY

Plan ahead to win

24

REFLECTOR PANELS

JIM AND CATHY CHURCH

A second light source — for free

38

THE SUBAWIDER II

JIM AND CATHY CHURCH

You can afford wide-angle photography

ADVENTURE

16

FANTASY FLIGHT

HOWARD HALL

A ride to rival fiction

WRECK DIVING

18

RAISE THE MONITOR

ELLSWORTH BOYD

Controversy over the fate of an ironclad

34

EAST COAST WRECK DIVE

PAUL TZIMOULIS

The *Honest Archie* takes you there

LOCAL DIVING

40

THE GIANT GROUND SLOTH

BILL BARADA

Divers find fossils

DIVE EQUIPMENT

49

PORTABLE AIR COMPRESSORS

ERIC HANAUER

Pumping air — anywhere

MISCELLANEOUS

59

SEAQUEST

HOWARD HALL

Strictly the top of the line

MARINE LIFE

64

PEPPERMINT STICK LOBSTER

STEVE LUCAS

A clawed Caribbean creature

FOREIGN TRAVEL

66

THE ISLE OF PINES

RICK FREHSEE

The first Cuban dive resort

76

BONAIRE DIARY

JOHN BATEMAN

Teenage scuba fever

DEPARTMENTS

6

DIVER'S CALENDAR

28

FILM FESTIVALS

61

TRAVEL PAGE

13

SCUBA QUIZ

44

NEW GEAR

102

RX FOR DIVERS

22

TECHNIFACTS

46

FISH OF THE MONTH

112

DIVER'S DIRECTORY

STAFF

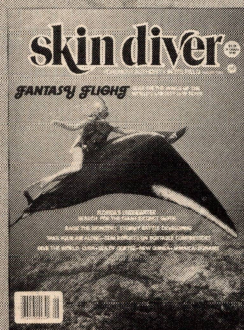
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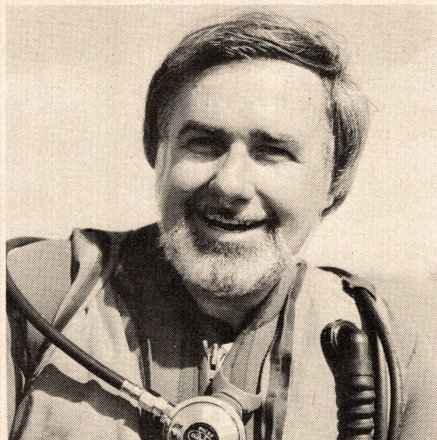
In the Sea of Cortez, Gordy Waterman catches a ride on a huge manta ray nicknamed Grandad. Howard Hall took this photograph using a Nikonos III camera with a 15 mm lens and a Subsea 150 strobe.



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SDM Editorial

BY THE PUBLISHER



A HEALTH CHECKUP FOR YOUR SCUBA TANK

Every certified diver is aware of the problem of internal corrosion in steel scuba tanks. And few divers today will argue against the wisdom of a hydrostatic test every five years. It is a federal law, and a requirement dive shop operators gladly welcome. Internal corrosion weakens the tank, transforming it into a potential bomb. Neither the dive shop operator who has to fill this tank nor the user should take this kind of risk. We are all aware of the problem and most divers adhere to the hydro requirement with regularity. However, new evidence indicates a five year hydro test is not enough. Tanks can, and do, rust out in less than the time between hydros.

The University of Rhode Island was the first to conduct and publish research done on the problem of rapid internal corrosion in steel scuba tanks. Eight years ago they conducted tests which proved that tanks can corrode internally to the point of possible explosion in as little as 100 days. Further examination of some 40 condemned-in-service scuba tanks revealed two of them contained sufficient rust material to completely clog a scuba regulator. The most amazing part of this 57 page report was a technical explanation of exactly how internal pinhole corrosion occurs, and how rapidly it can penetrate the steel wall of a scuba cylinder. The conclusion was that the DOT hydrostatic test every five years was not sufficient to give a tank "a clean bill of health."

Moisture is the enemy of scuba tanks; but, since most divers cannot see what is happening, they do not understand the seriousness of the problem. It only takes a few microscopic droplets on the filler nozzle or tank valve while the tank is being hooked up for a fill. Another cause of internal water droplet formation is letting the air out of a tank too quickly. Sudden depressurization causes tank chill-

ing; this causes tiny water droplets to condense on interior walls of a tank, since cool air cannot hold as much moisture as warm air.

Most divers assume the air being pumped into their tank is completely dry, but this may not be necessarily true. Most air contains at least a tiny amount of moisture. The moisture content of the air being pumped into your tank can vary considerably, depending on the atmospheric humidity surrounding the compressor and the efficiency of the compressor's filters.

The concept of visual inspection (VIP) has finally caught on as more and more dive shops become aware of the dangers involved with pinhole corrosion and rust-clogged regulators. The cost of such an inspection starts at about \$2.50 and goes as high as \$10, depending on the store offering this service. Still, there is much confusion and distrust by some divers who are convinced that internal tank corrosion inspection is a rip-off. Most of the holdouts are old-time divers who have never bothered to update their education on such a vital subject as tank maintenance. Another problem group is the procrastinators. These are the divers who keep promising to have their tanks visually inspected, but never seem to find enough time to have it done. Secretly or subconsciously, they are worried that the tank might not pass inspection.

It is truly a pity that divers in this day and age continue to ignore the need for visual tank inspections. It is estimated that hundreds of tank explosions have been avoided by this simple program, and that many, many lives have been saved. One California repair center, which inspects 3000 tanks annually, reports that two percent of the tanks checked are condemned as a result of visual inspection. The removal of 60 po-

tential bombs from circulation annually has helped to avert a great number of serious accidents. The percentage of tanks which should be condemned could run as high as five percent in other parts of the U.S., where visual inspections are not conducted as regularly as they are in California.

The big question is — how often should a tank be inspected? The consensus of opinion among scuba tank experts is that a hydrostatic test every five years is adequate, as long as frequent visual internal inspections are conducted during the interim period. There is no sense in stretching the walls of the tank (by 5/3rds of the working pressure) more frequently and thereby shortening the lifespan of the tank.

Until recently, it was thought that a visual internal check once a year was enough, but studies indicate more frequent checks are needed in areas of high humidity or heavy use. Al Thompson, nationally recognized authority on tank maintenance has provided the following guide for recommended visual internal inspection:

Every 12 months—tanks filled in dry, inland areas.

Every 6 months—tanks filled aboard dive boats.

Every 6 months—tanks filled at tropical dive resorts.

Every 6 months—tanks filled at beachside or pierside air stations.

Every 3 months—tanks used for rental or scuba training.

The key factor is our old enemy — moisture. High humidity areas are the most dangerous when it comes to the health of your tank.

If you haven't had a peek inside your scuba tank in the last year, don't wait another week. Get your tank visually inspected right now. It could save your tank — and possibly your life! 🐠

Commercial Diving Is Serious Business



The demand for natural resources from the sea has never been greater. Twenty years ago, there were only a handful of offshore drilling rigs located in coastal and gulf waters. Today, there are thousands of deep-water platforms throughout the world. The need for qualified personnel to man and operate these facilities is ongoing. Your entry into the world of deep-sea diving will be a most prestigious and rewarding career. *Not only is there a demand for divers in the oil industry, but underwater construction, salvage, farming and environmental awareness need trained technicians also.* Your first step to employment as a commercial diver is training.

Divers Institute of Technology (DIT) was founded by men who have successfully met the challenges of inner-space. They know from experience what it takes to get the job done. Retired Navy and professional deep-sea divers joined forces over 13 years ago to establish a commercial diving school that would train and graduate only qualified entrants to the industry. The success of the DIT program can be measured by our physical growth, the credentials we have attained, and not only the number of top workers we have supplied to major commercial diving firms throughout the world in the oil industry, but to companies in

salvage and repair, inspection, underwater farming, etc. *We do not specialize only in the oil industry as some schools do.*

Divers Institute of Technology developed a six-month course that set an industry standard. Training is based on a highly sophisticated deep-sea diving program that prepares you both mentally and physically to enter this new environment. Our curriculum has been designed to prepare you for gainful employment in *all fields* of commercial diving, *not only in the oil industry.* Classroom instruction deals in facts and theory. Open water instruction gives you the practical application of classroom techniques. *The culmination of your training is actual dives to depths of 200 feet. To our knowledge, we are the only commercial school that puts you to this test. The confidence gained from this experience is unequaled.* Before you decide which school to attend, check this point out. Many schools provide only simulated deep dives in recompression chambers and diving tanks on dry land.

After proper training and graduation, you are prepared to enter the commercial diving field. It is then that you will realize a great deal of responsibility comes with the territory. Responsibility to perform the tasks you were trained to do! Responsibility to your diving team and responsibility to all support personnel. *DIT will not graduate a student unless confident he possesses the ability to become a qualified commercial diver.*

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Diver's Calendar

August 7-10 Third annual People Interested in Diving Treasure Hunt, co-sponsored by the Sunken Treasure Dive Shop. (Contact: Rich Best, Sunken Treasure Dive Shop, RD#4, Jersey Shore, PA 17740)

August 28-29 San Diego Underwater Photographic Society's 17th Annual Underwater Film Festival. Staged at the San Diego Civic Theater, San Diego, CA. (Contact: UPS, P.O. Box 82782, San Diego, CA 92138; or call Zona Wahrenbrock at (714) 273-1224)

August 29-30 NAUI Diving Safety Seminar, Highline Community College, Seattle, WA. Sponsored by NAUI Pacific Northwest Branch. (Contact: Walt Amidon, 1407 South 118th, Tacoma, WA 98444)

September 5-7 Montana State Dive Festival, Holland Lake Lodge, Seeley Lake, MT. Lectures on dive safety and high altitude dives. (Contact: Ken Stevens, 3711 Third Ave. N, Great Falls, MT 59401)

September 11-13 New Medical Aspects of Diving Conference, Stanford Sierra Lodge, Tahoe, CA. Sponsored by NAUI Mid-Pacific Branch. (Contact: Nancy Guarascio, Conference Director, 5701 Snake Road, Oakland, CA 94611; (415) 482-2326)

September 25-26 Fifth Annual Cayman Party, Houston Oaks Hotel, Grand Cayman, BWI. Slide presentations and dive music by Barefoot Man and his band. (Contact: The Cayman Party, Box 1249, Grand Cayman, BWI)

September 26 Underwater '81 — the Fall Edition of the Underwater Film Review — John Hancock Hall, Berkeley St., Boston, MA. (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117)

September 26-27 Sixth Annual Sonoma County Diver Rescue Workshop, Santa Rosa Junior College, Santa Rosa, CA. (Contact: Sonoma County Diver Rescue Workshop, P.O. Box 3967, Santa Rosa, CA 95402, Attention: Mel Cumins — Send a self-addressed envelope with 36¢ postage)

October 4-9 In-Depth Diving Seminar on Catalina Island, CA. Presentations and practice sessions on advanced dive skills. (Contact: Jon Hardy, Argo Diving Services, P.O. Box 1201, Avalon, CA 90704; (213) 510-2208)

October 16-17 Fifth Annual Underwater Film Symposium, sponsored by the Rockford Divers Association and featuring Paul Tzimoulis. Holiday Inn, South Beloit, IL. (Contact: Bill Steinborn, 1385 Randall Dr., Rockford, IL 61108; (815) 332-4225)

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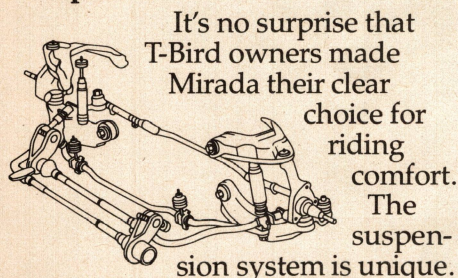
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How well they succeeded shows in Mirada's rating of **18** EPA est. mpg.,* unsurpassed by a comparable Thunderbird; and 24 est. hwy. And in the results of an independently run test.

Mirada preferred to T-Bird by more than 2 to 1.

Fifty Thunderbird owners** judged a Mirada CMX against a comparably equipped T-Bird. They judged them for such qualities as riding comfort, driving ease, power, convenience, styling and value. Result: these Thunderbird owners preferred the Mirada overall by the overwhelming margin of 34 to 16.

Engineered to reward you with a superior ride and better control.



Transverse mounted torsion bar front springs—located ahead of the front wheels and rubber mounted— isolate the shock of bumps and pot holes from the car. You'll appreciate how little fatigue and tension you feel after a long day's drive.

Concern with human physiology is as much a part of Chrysler engineering as is the geometry of a car's suspension. Mirada's driver oriented interior provides bucket seats contoured to hold you comfortably for hour after hour behind the wheel.

Mirada's overall driving ease and cornering ability, as well, were rated over Thunderbird's. Power assisted recirculating ball steering gives you sensitive control. You never lose the intimate "feel" of the road that epitomizes the well-mannered road car.

Engine technology that delivers more torque—with economy.

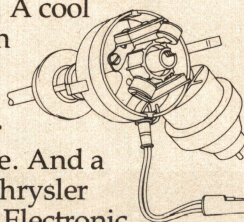
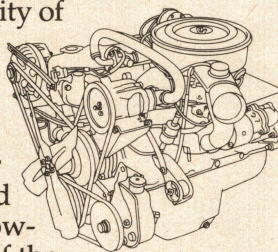
A majority of

Thunderbird owners chose Mirada for pickup and passing power.

Much of the credit must go to Chrysler's standard Slant-Six engine, a proven design with countless refinements in its lifetime.

Some of the latest: Hydraulic valve lifters that need no periodic adjustment. A cool air induction system that improves hot weather performance. And a landmark Chrysler innovation, Electronic Ignition, in which there are no points to wear or need replacing. And the consistently high voltage that results improves performance and reduces spark plug failures.

Chrysler engineers designed Mirada to take you with undiminished power and unimpaired fuel



efficiency for 30,000 miles between tuneups.

Jury's choice: an instrument panel engineered for the driver.

T-Bird owners were outspoken in their preference for the efficiency and appearance of Mirada's interior. Behind the sporty 3-spoke steering wheel is your information center, tuned to the convenience of the driver: Gauges, lights, switches set in brushed aluminum applique: trip odometer, brake system warning light, speedometer.

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Mirada's base sticker price includes as standard: Auto. trans. Power steering. Power brakes. Tinted glass. AM radio. WSW glass belted radials. Anti-corrosion protection.

The Mirada CMX shown, priced at \$9,277,† also includes: Color-keyed cabriolet vinyl roof. 15" steel belted radials. Forged aluminum road wheels. Cornering lights. Sill moldings and wheel lip moldings.

Other options:†† Air cond., \$625. With auto. temp. control, \$678. Auto. speed control, \$149. Power bucket seat, \$187. Choice of 6 sound systems, and a full complement of power assists.

Mirada, the personal car engineered without compromise. Buy or lease yours at a Dodge Dealer.



The New Chrysler Corporation

*Use EPA est. mpg. for comparison. Your mileage may vary depending on speed, trip length and weather. Actual hwy. mileage and CA. estimates probably lower. Comparison with Thunderbird based on both cars with standard 6-cylinder engines. **Randomly recruited in Los Angeles area.

†Sticker price excluding taxes and destination charges. ††These options may require the purchase of additional optional equipment.

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(3) "Nobody ever sees the photographs of contest winners." Wrong! The national dive magazines regularly feature the work of contest winners, and such displays have appeared in dive catalogs, posters, film show exhibits, and local dive stores.

(4) "The prizes given usually aren't worth much." Incorrect. The prizes awarded to photography contest winners in 1979 alone were valued in the tens of thousands of dollars. These included dive vacations, boat trips, dive and camera gear, custom prints and much more.

(5) "You have to live in an area with ideal dive conditions to be able to enter contests." Untrue. Not only are these contests available in all parts of the country, many larger competitions can usually be entered by mail. More importantly, as will be discussed later, the inland photographer may even enjoy some real advantages in most competitions. Additionally, your occasional vacations to tropical areas can be even more enjoyable when the trips include photographic goals.

(6) "To the serious, aspiring photographer, entering contests is a waste of valuable learning time." Wrong! This aspect may be the most important consideration for any interested photographer, regardless of the degree of involvement being sought. For the amateur, designing and creating a desired photograph for contest entry may be the first real opportunity where a growth in skills, knowledge, and technique are required to meet an immediate photo-

How to Win a Photo Contest

Text and Photograph by Al Hornsby

For the aspiring amateur photographer, the age old question has always existed. "Just how do I share my work with others?" In underwater photography, a relatively small field, the opportunities are even more limited. So the question remains: What is the easiest, most direct way for amateur photographers to exhibit their work?

The answer, most likely, is through an increasingly popular and growing number of underwater photography contests. These contests, whether sponsored by the training associations, dive magazines, manufacturers, clubs, or dive stores, offer a direct means for involvement, purpose, public exposure, acclaim, publication, and very often, valuable prizes.

Before we explore the considerations important to winning, let's dismiss a few

fallacies that have long existed concerning photography contests:

(1) "Only the pro's can win." Nothing could be further from the truth; in fact, as professional photographers are generally excluded (or put into separate categories) in amateur competitions, even beginning photographers can feel comfortable that their work is being compared to that of other aspiring amateurs.

(2) "It takes lots of expensive gear to take pictures suitable for competition." False. Several of the locally winning photographs in PADI's 1979 Underwater Photography Search/Competition, for example, were taken by new divers with Instamatics in plexiglass housings. Winning photographs displaying a sense of beauty or excitement can be taken with many different cameras, not just the most expensive.

graphic goal. In this case, the situation is similar to a working professional having to push to produce a required photograph, regardless of the limitations or difficulties involved.

So, with the goal being to enter (and win!) an underwater photographic competition, where do we begin? Let's take an inside look at some of the more important aspects, including: how contests are judged, considerations about subject matter and format, preparing (and packaging) photographs for submission, and importantly, locating the existing contests.

JUDGING

Although each contest may have its own particular set of parameters for choosing the winners, generally the con-

(Continued on Page 94)

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Scuba Quiz

Category: Portable Compressors

By Dennis Graver

The use of portable compressors is on the increase as divers venture to rugged and remote areas in search of ideal dive sites. While the ability to fill tanks is desirable, there are hazards that can result unless the person operating the compressor is knowledgeable and exercises caution. Find out if you understand some of the fundamentals of compressors with the following questions. The answers are on the following page.

1. Select the sequence that ranges from the least expense to the greatest expense for the operation and maintenance of a compressor:

- ☐ A. Electric, diesel, gasoline
- ☐ B. Diesel, electric, gasoline
- ☐ C. Gasoline, diesel, electric
- ☐ D. Diesel, gasoline, electric

2. It is most desirable for a portable compressor to operate at:

- ☐ A. High temperature and low rpm's
- ☐ B. Low temperature and high rpm's
- ☐ C. High temperature and high rpm's
- ☐ D. Low temperature and low rpm's

3. Select the false statement concerning portable compressors:

- ☐ A. The air intake hoses should be located near the ground or floor
- ☐ B. Electrically driven compressors cannot produce carbon monoxide
- ☐ C. Most air contamination is caused by the compression of impure ambient (surrounding) air
- ☐ D. All of the above statements are false

4. Which of the following may be used to determine the condition of a compressor:

- ☐ A. An analysis of the air
- ☐ B. Time required to fill a tank
- ☐ C. Amount of oil in the filtration system
- ☐ D. All of the above

5. As air is compressed, its temperature increases. When the compressed air is cooled, water condenses from it. This water must be removed from the air because (select the incorrect statement):

- ☐ A. The water will cause corrosion in scuba equipment
- ☐ B. Water, since it is incompressible, will cause a dangerously high back pressure in the system
- ☐ C. The life of the chemicals in the purification system is decreased in the presence of moisture
- ☐ D. The removal of carbon monoxide in the purification system requires extremely dry air

6. Desiccant materials are used in the air purification systems of portable compressors to:

- ☐ A. Dry the air
- ☐ B. Remove oil mist and hydrocarbons
- ☐ C. Protect the catalytic agent that converts carbon monoxide
- ☐ D. All of the above

7. Carbon monoxide can be removed from compressed air by:

- ☐ A. Mechanical separation
- ☐ B. Filtration
- ☐ C. Catalytic conversion
- ☐ D. Chemical adsorption

8. A back pressure of approximately 1500 psi is maintained in the filtration system of a compressor to:

- ☐ A. Extend compressor life
- ☐ B. Extend the life of filtration system chemicals
- ☐ C. Increase operational efficiency of the moisture separator
- ☐ D. All of the above

9. Which of the following cannot produce dangerous levels of carbon monoxide in compressed breathing air:

- ☐ A. Ambient air
- ☐ B. Oil burned within an oil-lubricated compressor
- ☐ C. Decomposition of oil from overheating
- ☐ D. All of the above are sources of carbon monoxide

10. To safely fill scuba tanks, the tanks should be immersed in water in:

- ☐ A. A rigid, highly reinforced container
- ☐ B. A soft, flexible container
- ☐ C. A soft, flexible container inside a rigid, highly reinforced container
- ☐ D. A rigid, highly reinforced container inside a soft, flexible container

Scuba Quiz

Answers: Portable Compressors

1. A. Electric, diesel, gasoline. There is a tendency to think of gas or diesel driven compressors when we think of portability. If electricity is available, such as from the generator of a motor home, electric compressors should be considered. They are quieter and cleaner than fueled units and tend to require less maintenance owing to reduced vibration. There are also fewer problems with contamination of the air when an electric compressor is used. Be sure to consider your needs and intended use when determining the type of drive unit for your compressor.

2. D. Low temperature and low rpm's. The slower and cooler a compressor can operate, the longer its life span and the better its chances of avoiding overheating problems.

3. B. Electrically driven compressors cannot produce carbon monoxide. CO can be manufactured by flash-dieseling of petroleum-based lubrication oil. Also, if this oil becomes hot enough, it can decompose and produce hydrocarbons.

4. D. All of the above. As a compressor ages, parts become worn inside it. The compression pressure will not be as high and the compression rings will not seal as effectively as when new. This can result in less efficiency and higher temperatures. A regular air analysis, an operating log including tank filling time, and a record of oil consumption are important in order to determine how well a compressor is performing. You should also be alert for visual indications of oil in the filtration system.

5. B. Water, since it is incompressible, will cause a dangerously high back pressure in the system. When air leaves the compressor, it goes through a mechanical separator to coalesce the water and any oil vapors into droplets. These droplets become too heavy to be carried with the air and collect in a sump for draining. It is important to keep this sump drained so water will not pass through into the filtration system chemicals, rendering them ineffective. Also, the effects of excessive moisture inside scuba tanks are well known. Back pressure in the system isn't a problem, because most systems operate with 1000 to 1500 psi of back pressure anyway.

6. D. All of the above. Desiccant materials dry the air thoroughly and are essential when the air must be used in cold water because the moisture in the air could freeze and cause regulator failure. The desiccants also absorb oil mist and hydrocarbons. Finally, catalytic agents such as Hopcalite for the conversion of carbon monoxide to carbon dioxide must be kept very dry in order to operate efficiently.

7. C. Catalytic conversion. CO cannot be removed by filtration. It can, however, be converted to carbon dioxide, which can then be absorbed by chemicals. The conversion chemical loses its catalytic capability very rapidly in the presence of water vapor, which is one good reason why dry air is a must in the filtration system. Modern technology has produced this miracle chemical, called Hopcalite, and it should be included in the purification system of a portable compressor.

8. B. Extend the life of filtration system chemicals. A back pressure of about 1500 psi results in a good balance between moisture separation and compressor wear. The temperature and pressure relationship is very important in the purification process. By lowering the temperature while maintaining a pressure between 1000 and 1500 psi, chemical life can be extended ten percent or more. The lighter the load on the compressor, the longer the life span of the unit. Compressors are equipped with a back-pressure valve on the filtration unit to maintain this optimum balance of back pressure in the purification system.

9. D. All of the above are sources of carbon monoxide. Care must be exercised to ensure that air drawn into the compressor is free of contamination, so the location of the compressor and its intake are very important. Even with clean air going into the compressor, CO can still be manufactured within a petroleum-based oil-lubricated compressor unless it is maintained and operated properly.

10. C. A soft, flexible container inside a rigid, highly reinforced container. Water is incompressible, so the force of an exploding tank is transmitted directly through the container in which the tank is immersed. With a strong outer container surrounding a softer one, force can be cushioned by the air space between the two containers and directed upward to prevent injury. Avoid bending over a tank during the filling process.

Compressors can expand your dive opportunities, but be sure you know how to use them properly. I suggest you write to the compressor manufacturers who advertise in this publication and request information on their products. They have some excellent literature available to help you decide which compressor is best for your particular needs. Here's wishing you pure air and clear water...

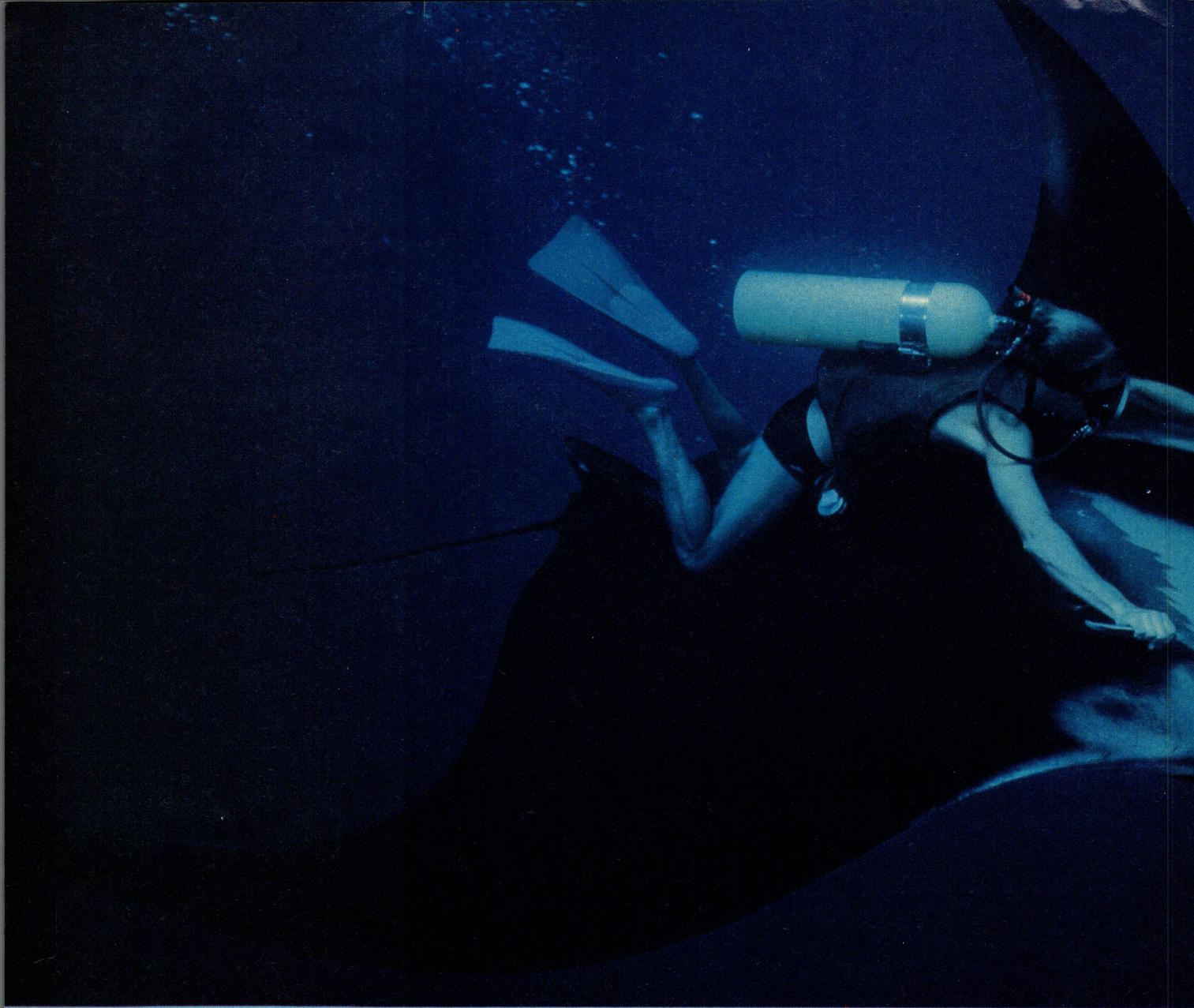
The Combo With The Edge In Design

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Fantasy Flight

**Author describes mind boggling
adventure - A ride on the back
of the world's largest winged
creature** Text and Photography by Howard Hall

Hanging on the anchor line of the *Don Jose* while waiting for an experience that would carry me off into fantasy, I was feeling slightly guilty for leaving my movie camera and filming responsibilities above. But I could not allow this opportunity to pass me by. I had faithfully filmed the phenomenon as everybody else on the film team rode. Now at last, alone, tired, all but dived out, my decompression meter too close to the red zone, I was determined to have my turn.

As I scanned the dark water on the far side of the seamount for the winged creature, I wondered if the others appreciated the significance of what was happening here. Surely if the writers of fantasy had this chance they would appreciate it. They have written of it in countless stories of imaginary worlds. The Hobbits are rescued from the

ward me. Once again I was awed by his size. From wing tip to wing tip he measured, at the very least, 18 and probably closer to 20 feet. His eyes were a full three feet apart! He was ten feet long from his head to the base of his tail! We had named him Grandad and he was the largest manta ray we had ever seen.

Grandad approached until he was directly below me, then, predictably, he seemed to deliberately hesitate as I released the anchor line and drifted down toward him. As I descended, my view of the bottom was completely blocked by the huge ray. It was like landing on the seamount itself. Gently I grasped the shoulders of Grandad's wings and felt the surge of power go through his body as his massive wings began to beat. The water began rushing past my face, sucking my exhaust bubbles down across my back and along my legs. Then, holding fast to Grandad's enormous shoulders, I flew off into the dark, deep waters beyond the edge of the seamount. Reality had become fantasy, and fantasy had become real.

It is not clear why this manta allowed our film crew to ride upon its back. Certainly, its slightest shrug would send its fragile rider tumbling. In fact, the manta did shrug once, leaving Stan Waterman with a bloodied lip. And, once the ray did an outside loop that was too much for Peter Benchley and sent him tumbling. Stan, Peter, and Dr. Ted Rulison were the stars of our film and all three rode Grandad at once on several occasions, with room for more.

When Grandad first showed up at the seamount we noticed that a large heavy rope was tangled around his head. Gordy Waterman and Dyanna Taylor followed the manta for an entire dive in efforts to cut the line off. The rope had been there a long time and was deeply embedded in the ray's flesh. Toward the end of the dive Gordy finally succeeded in removing most of the line. Later that day Grandad allowed Michele Binder to ride on his back and remove the remainder of the rope. Since the divers had rid the manta of a painful "thorn," some crew members thought that perhaps the animal regarded us as large cleaner fish. It did seem as if the manta actually encouraged us to ride upon its back.

Grandad carried me out into the open water beyond the seamount and then he began to descend. At 100 feet he leveled off and went into a steep

right bank raising his left wing high toward the sunlit surface and dropping his right wing toward the dark water below. As Grandad turned, I was able to look straight down and saw the bottom about 40 feet below. I had expected the water to be much deeper here and I knew we were well away from the seamount. Then I saw a dark cliff rise before us. It was a second pinnacle — an area we had searched for and had spent days finding. Grandad had found it moments after the beginning of our ride.

Once again Grandad banked right and I knew he was heading back in the general direction of the seamount. He continued to descend following the bottom contour between the pinnacles. Looking over Grandad's shoulders I saw hundreds of magnificent gorgonians in dozens of colors as the bottom rushed past. We dipped beneath a beautifully delicate jellyfish and in the distance I saw a small group of hammerhead sharks pass by. I was living a dream and yet I knew I must check my decompression meter: the sight of the needle in the red zone would bring back an unwelcome reality. But, Grandad insisted upon descending.

My ride ended at a depth of 120 feet. I simply couldn't stay down any longer without risking decompression sickness, and there was no way I could control Grandad's direction. Reluctantly I released my hold and the great ray passed beneath me. His huge wings stopped beating and he glided slowly away as if saying, "Hurry and catch up, I'll wait for you." For a moment I hung there motionless and with the slight buzz of nitrogen narcosis I imagined Grandad calling me to follow.

I began my ascent and watched Grandad disappear into the deep plankton layer. This would be our last day in the Sea of Cortez. In the evening the Baja Expeditions' *Don Jose* would return us to La Paz and we would fly back to the U.S. I found my way back to the seamount and resumed my grasp on the anchor line for decompression. As I waited for my meter to come out of the red, I noticed Marty Snyderman kneeling on the edge of the seamount — apparently waiting for Grandad to return one more time. Somehow I knew he wouldn't be back this afternoon and tomorrow we would be gone. I relaxed, closed my eyes, and tried to memorize emotions I had experienced during my flight into fantasy. »

Dark Mountain by the King of the Eagles and fly away astride the shoulders of the great bird. And, in a world called Pern, the heroes fly through the clouds on the backs of winged dragons. They are the Dragon Riders of Pern. What child hasn't dreamed of flying off into wind-swept skies on the back of his own winged beast?

But, as children grow into adults, these dreams fade. Oh, we may still be entertained occasionally by the skilled writings of dreamers, but we haven't the time to waste on wishing for things impossible. Yet childhood dreams never fade away entirely, and impossible is not always an absolute.

A movement on the edge of visibility snapped me out of my daydream like the crack of a whip. My heart began to pound as a dark shape materialized into a great winged beast flying to-



Fred Kelly, a member of an oceanographic team aboard the Research Vessel, *Eastward*, glanced at the sonar recorder and saw an echo scribbled across the paper. It was just a little echo, but enough to arouse his curiosity and lead to one of the major marine archaeological discoveries of the 20th century.

The *USS Monitor*, famed "cheesebox on a raft," studied by every school child in America and pursued by a throng of underwater scientists and adventurers, was found by the *Eastward* and its Duke University research team in 1973. Since then, numerous expeditions — including one by Jacques Cousteau and the crew of the *Calypso* — have investigated the deep-water wreckage, retrieving photos and relics from the little ship that

launched a modern navy. Legally protected, the *Monitor* is listed in the National Register of Historic Places and in January, 1975, was designated as America's first National Marine Sanctuary.

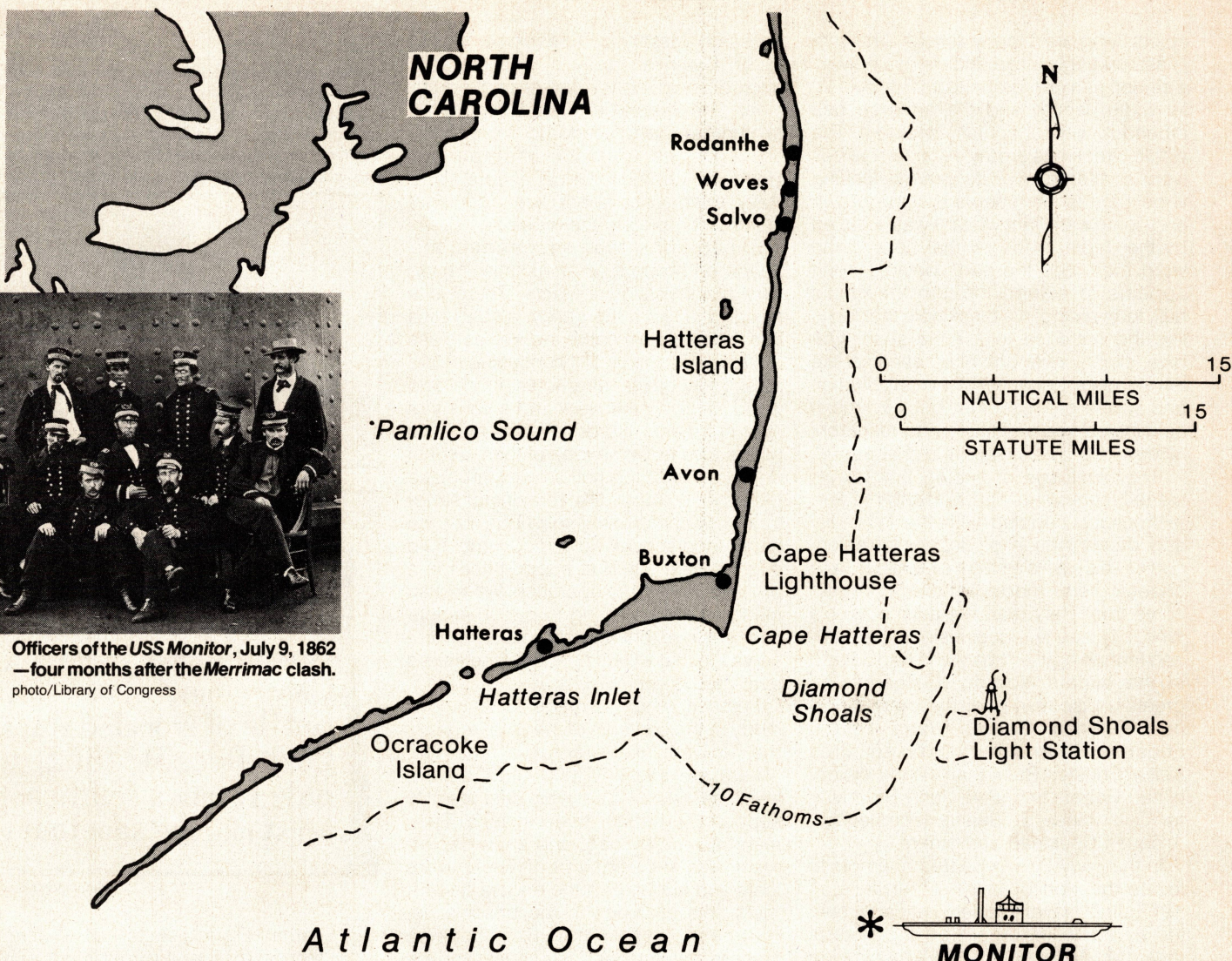
But there's no requiem for the famed warship, resting 210 feet down in the graveyard of the Atlantic. Despite rough seas, treacherous currents and a prohibitive depth, she keeps surfacing in the media where historians, scientists, archaeologists and preservationists debate her future.

There are two schools of thought on raising the *Monitor*. The first, favored by archaeologists from North Carolina, recommends leaving the wreck untouched until technological advances enable the whole site to be worked as an archaeol-

ogical find. Gordon P. Watts, Jr., underwater archaeologist for North Carolina's Department of Cultural Resources, and a member of the 1973 expedition that discovered the *Monitor*, says: "This isn't simply a question of whether it can be raised or not, but can it be recovered in a way that will enhance its historic and archaeological value to the nation. If we are going to destroy the ship in the course of raising it, then it would be best just to leave it on the bottom. However, from the evidence already accumulated, I'd say our chances of recovery are looking better all the time."

The second school of thought advocates raising as much of the ship as possible before the iron deteriorates in the salt water. It's believed that in a few years

RAISE THE M



Officers of the USS Monitor, July 9, 1862
—four months after the Merrimac clash.
photo/Library of Congress

the iron that remains now will become as soft as clay and be impossible to raise and preserve.

Few dives could be more fascinating than the descent on the *Monitor*, whose historic battle with the *Merrimac* carved an indelible niche in America's past. And only a few divers can capture the drama and excitement of their plunge into history. One of these is Ernest W. Peterkin, a retired U.S. Naval Reserve captain from Camp Springs, Maryland.

Twelve years of research and study qualify Peterkin as a leading authority on the USS *Monitor* and earned him a berth aboard the Johnson Sea Link, a small submersible that explored the wreck.

"Approaching the *Monitor* was like

landing on an aircraft carrier," Peterkin nostalgically recalls. "Immersed in an azure-blue sea — unusually good visibility for that area — it was like having sky all around us, while in the dim water below a faint silhouette appeared from out of nowhere. Schools of silver amberjack greeted us, like interceptors, first checking us out, then escorting us to the mother ship. Were it not for the glass port separating the passengers from the sea, the four of us aboard the sub could have reached out and touched history. At the same time, an unexpected visitor looked like he wanted to reach in and touch us. We named him 'Sam,' a 100 pound grouper nearly five feet long, who peered into the bubble like a country kid watching a carnival sideshow.

"We came alongside the ship which rests bottom up, its distinctive turret lying beneath it, very visible and stabilized. We cruised slowly around the hulk, pausing periodically to study the various sections of the deck and hull. Heavy dents on the turret were tell-tale evidence of direct hits by the *Merrimac's* cannonballs during the four hour clash between the ironclads over 100 years ago. Eighty to 100 feet north of the wreck we examined torn metal plates and other debris scattered along the bottom.

"We think the *Monitor* was damaged during World War II by depth charges dropped on German submarines that lurked off the Carolina coast. We are reasonably sure that we spotted the *Monitor's* smokestack, a long collapsed

ONITOR!

Scientists and Scuba Divers
Debate the Future of
America's Legendary Shipwreck

By Ellsworth Boyd

object, lying amid the wreckage. The ship is astoundingly large and there's no way a person can comprehend its true size — its width, length and the armored belt around it, without actually seeing it. The whole wreck has a gray aura, as if ashes were scattered over it. Strange looking vegetation is interspersed, some brown and some a brilliant white. I was amazed by the depth of the pit that housed the ward room and the berth deck. The pit appears to extend through the ship's hull, terminating in a black hole that looks like the entrance to a mine shaft. Our dive, slightly over one hour, seemed like ten minutes because of the fascination and appeal of this journey back in time. It culminated years of study and research, while initiating new plans and challenges."

The challenge of finding the *Monitor* started many years ago, and only modern technology, coupled with the ingenuity and determination of dozens of scientists, oceanographers and archaeologists, made a historic dream come true. They read like a list of Who's Who in ocean science, history, research and technology — those who had a hand in the events leading to one of the greatest discoveries of the century: Ernest Peterkin, Gordon Watts, Harold Edgerton, Bill Andahazy, Ed Miller, Fred Kelly, Chester Buchanan, Andy Reichnitzer, Robert Sheridan, John Broadwater, Colin Jones, Bill Searle, John Newton, Jacques Cousteau and others.

In the early 70's, repeated attempts to locate the *Monitor* failed. Meanwhile, in 1973, eight Naval Academy midshipmen, led by Ed Miller, organized a project of their own (Miller later wrote a fascinating book: *USS Monitor — The Ship That Launched A Modern Navy* — available from him at 1011 Van Buren St., Annapolis, MD 21403). The midshipmen arranged for a Navy submarine hunter to fly over a possible wreck site near the Cape Hatteras lighthouse. But the search was in vain and a few weeks later Duke University officials announced that the Research Vessel, *Eastward*, had tentatively located the long sought Union wreck. Turbulent currents prevented the *Eastward's* cameras from photographing the entire ship. A still camera snagged on the hull and was lost. Only the stern was photographed and more pictures were necessary to solidify the find.

Experts convened in a meeting at the Naval Research Laboratory in Washington, where the eight midshipmen presented corroborative magnetic data, obtained from an aerial survey, that supported the wreck's identification. It was fitting that the Navy, whose Civil War ironclad was the forerunner of its modern-day battleship, lent a helping hand in the final consensus that the *Monitor* had been found.

A joint follow-up expedition aboard the

Research Vessel *Alcoa Seaprobe*, set out in 1974 with an array of sophisticated photographic and video-taping equipment. The *Seaprobe* team assembled a preliminary photomosaic from 2000 photographs that documented the *Monitor's* remains. Once ashore, U.S. Navy specialists spent five additional months completing the mosaic.

Expeditions that succeeded the *Seaprobe* brought up an astonishing variety of interesting artifacts. There is a mustard jar from the galley, a soap dish from the captain's cabin, as well as glass bottles, a mason jar still containing relish, nuts, bolts, davits, fragments of coal and wood, deck light covers and a variety of steel hull plates. Gordon Watts says: "The plates give us some idea of the extent of deterioration of the hull so we can make projections about the remaining structural soundness of the ship. This way, we hope to discover how much the ship might be expected to support itself in a proposed recovery operation. We're also planning ahead, trying to get an indication on the extent and complexity of preservation that will be needed if the ship is ever recovered."

Peterkin, who has made a meticulous study of the contents of the ship, regards the *Monitor* as a veritable museum. "There are easily 10,000 items aboard her," he says. "She was designed to support 50 men for three months. Each man had a ditty bag, and each department was fully equipped. There were tools and supplies in the engine department, lots of things in the bosun's department, plus ammunition, cooking utensils, navigational instruments and the contents of each officer's dresser. It's an incredible amount and it's all still there, either inside the hull or in the sand around the wreck."

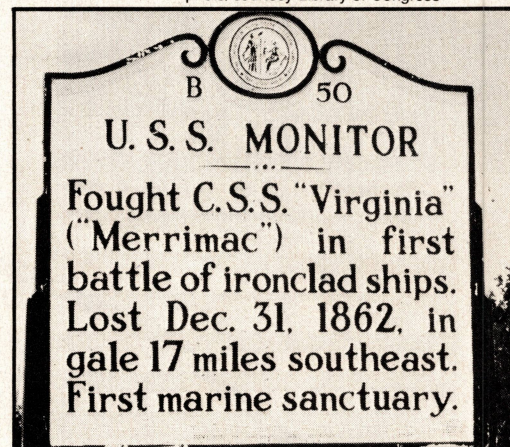
Because of its distinctive design, the *Monitor* was the most technologically advanced ship of its time, regarded as the prototype of the modern battleship. Among the nearly 40 inventions that could have been patented had she not sunk, were flush toilets, a screw propeller, armor, forced-air ventilation, a hidden anchor and a revolving turret. The turret, mounted on the flat deck, gave the ship her "cheesebox on a raft," nickname. Fabricated from eight inch armor plating, the rotary box permitted the guns to shift aim while the ship remained on course.

The ship rests upside down, part of it leaning on the gun turret which archaeologists feel is the most feasible part of the ship to salvage. Nine feet high and 21 feet in diameter, the turret is purported to house two 11 inch Dahlgren guns that were later engraved in honor of the *Monitor's* valiant stand. And, inside one of these guns may be the skeleton of a black cat. Eyewitness reports told of the doleful wail of the feline while the ship was sink-

Upper, an artist's concept of the four hour (often point-blank) shootout between the ironclads *Merrimac* and *Monitor*. The battle ended in a draw. Lower, this North Carolina monument commemorates the *Monitor*. It stands on the shoreline near her underwater grave.



photo/courtesy Library of Congress



photo/Jean Miller

ing. Seaman Francis Butts, not wanting to kill the cat for fear it would bring bad luck, put the frightened animal inside one of the Dahlgren guns and plugged it up. "But I could still hear that distressing howl," survivor Butts told reporters later. The other gun was stuffed with a gold watch, a pair of new boots and an officer's coat.

Archaeologists have confirmed that some of the turret dents were inflicted by the guns of the Confederate ironclad *Virginia*, alias *Merrimac*. (The original Union steam frigate, *Merrimac*, burned and sank, but was raised, rebuilt and christened the *CSS Virginia*.) The famed battle, called *Monitor* versus *Merrimac* in most history books, took place off Hampton Roads, Virginia, March 9, 1862. Union citizens were hysterical, fearing that the Confederate ironclad *Merrimac* might steam up the Potomac and bombard the Capitol. She was already methodically destroying the wooden federal fleet, ship by ship. In desperation, the *Monitor* was hurriedly built, and upon completion people wondered if the Navy Department had gone mad spending money on such an unconventional design. They feared that she could not possibly carry the weight of iron that designer John Eric-

The crew of the *Monitor* is seen cooking a meal on her deck. The deck was armored with one inch thick iron plates and the gun turret (pictured in the background) was covered with eight inches of armor.



photo/NOAA

son had placed on her. Some called the ship "Ericsson's Folly," and were sure that such a small vessel, carrying only two guns, would be slaughtered by the 10 gun *Merrimac*.

The rest is history. Shot and shell ricocheted off both armored vessels as they blazed away — often at point-blank range — in a four hour shootout that ended in a draw.

A few months after the battle, Confederate sailors destroyed the *Merrimac* to prevent it from being captured by federal troops that seized Norfolk. The *Monitor* met her sad end a little more than nine months after the historic battle. Four days after Christmas, 1862, the Union side-wheeler, *Rhode Island*, was towing the *Monitor* to Beaufort, North Carolina to strengthen the naval phase of a combined land and sea attack on Wilmington. Seas were calm until sunrise, December 30, when strong winds kicked up, threatening gale conditions. By nightfall, in the choppy, rampant swells, the *Rhode Island* lost control of the *Monitor*.

Three seamen volunteered to go forward to cut the towline. Two were washed off the deck of the ironclad and drowned while the third succeeded in parting the line. The heroine of the most famous sea

battle of the Civil War was again on her own, but her adversary was much tougher than the *Merrimac*. As the *Monitor's* anchor was dropped, the chain ripped the watertight packing out of the hawsepipe, leaving an eight inch hole for water to pour through. It gushed into the engine room and doused the fires. Without steam, the pumps stopped and the proud 173 foot long warship started to founder. Desperate men passed buckets hand over hand in a futile effort to bail her out. The decks, with a low two foot freeboard, were awash. The black cat wailed from the turret and the wind howled in a nightmare at sea that survivors would never forget. One of the survivors, paymaster William Keeler, later wrote: "The scene aboard our dying ironclad appalled the boldest heart. Mountains of water rushed across our deck. The small rescue boats were mere playthings crashing against our sides amidst the foamy billows. The ghastly glare of the blue lights burning on our consort created a panorama of horror that time will never efface from my memory."

The captain, clutching his personal treasured jewel box like a loaf of bread, called for his men to abandon ship. The

crew forfeited their belongings to the waist-deep waters below decks and the paymaster left his safe behind. The last rowboat was lowered, too small for all that remained. With a promise that it would return, some of the crew started a lengthy journey toward the *Rhode Island*, separated from the *Monitor* by over one mile of churning waters. When the boat finally reached the rescue ship, the men scrambled aboard.

Struggling through raging seas, seaman Rodney Brown headed back to the ironclad. Three-fourths of the way back to the foundering vessel, he watched helplessly as the distress lanterns vanished beneath the waves. The *Monitor*, with a loss of 11 men, sank early in the morning on New Year's Eve, 1862, 16 miles southwest of Cape Hatteras, off Carolina's outer banks.

Not long after the shouts of the desperate men faded into the black stormy night, and the *Monitor* disappeared, a new controversy arose out of the bizarre chain of events on that infamous New Year's Eve. How dare the Navy lose its famous ironclad at sea? Was it due to poor seamanship? Or was it a flaw in her design? Did her hull separate from the upper raft? Why was it that the ironclad *Passaic*, built right after the *Monitor*, survived the very same storm? Was it true that the *Monitor* was basically a river and harbor craft, intended for blockading Southern ports and not designed to sail the open sea under her own steam? Were her decks nearly awash under the best of conditions because of her low, two foot freeboard?

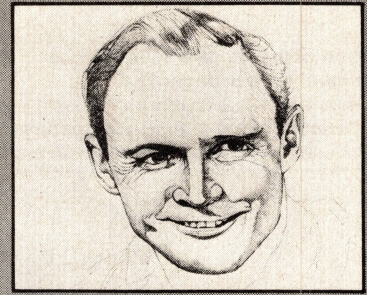
The *Monitor* is no longer one of the forgotten mysteries of the sea. Her story is far from over as the National Oceanographic and Atmospheric Administration, the North Carolina Division of Archives and History, and the Harbor Branch Foundation continue to study the possibilities for raising parts of her ghost from deep waters — no easy task by any means.

As Gordon Watts says, it isn't simply a question of whether the ship can be raised or not. The real question is whether it can be recovered in a way that will enhance its historic and archaeological value to the nation.

Personally, I have mixed emotions about the "cheesebox on a raft" I studied in the fifth grade. I'm not sure if I want to see her raised. We might be better off letting the old gal rest in peace. It is a difficult decision. Many people have different opinions about the *Monitor's* future. What do you think should be done? Should this ship of such great historical significance be recovered and enshrined to serve as a constant reminder of our American heritage, or should she rest in peace in the graveyard of the Atlantic and remain a National Marine Sanctuary?

Technifacts

BY E.R. CROSS



Technifacts for May, June and July dealt with small boat inspection, repair and salvage. This month we offer several hints for divers wishing to engage in the search and recovery of automobiles, trucks, planes and cargoes of commercial carriers.

Before attempting any dive work on a car, truck or plane that is underwater, it is advisable to inspect a similar vehicle on the surface. Become familiar with all points of entry, locking systems, storage areas, and weak sections, through which a diver may be able to force an entry if all other entries are blocked. Before beginning any recovery work underwater, determine the cargo of the truck or plane and discuss with responsible and informed persons the way it is stored. Most underwater jobs will be easier to accomplish if a pre-dive investigation is done. Make notes and sketches of findings and go over these with all dive team members just prior to the dive.

The basic preliminary work, and basic dive techniques, required in this type work are the same as for inspection and salvage of small boats. They involve search skills, flotation, inspection, and salvage. However, the entire project is more complicated and hazardous, and will require more personnel, equipment and planning.

DIVE TEAM REQUIRED

Most of the work discussed in this series of Technifacts involves search and recovery of comparatively small objects and could be accomplished safely with a two man dive team. When entering into work involving cars, trucks and planes, larger dive teams must be considered. These teams must be well equipped and organized. The best qualified person must be selected for each phase of the work.

Scuba is acceptable equipment for most car search and recovery jobs. However, even for this comparatively simple job, it will frequently be advisable to use surface tended divers, descending and search lines, and some system of communication, such as hand signals. When the search and recovery team is working on and in trucks and planes, surface air supplied dive equipment is recom-

mended. Certainly scuba equipped divers must use a surface tended mode and have a relief diver immediately available. Whether using surface air supplied equipment or surface tended scuba, a diver entering a truck, trailer or plane must have a line tender stationed outside the sunken vehicle.

AUTOMOBILE SEARCH AND RECOVERY

Divers are sometimes hired by local law enforcement agencies to search for and recover automobiles that are lost in lakes, rivers, or occasionally, the sea. Police departments are usually responsible for such work. In some localities the police or fire departments have their own rescue teams to search for victims involved in such wrecks. Only occasionally do rescue teams get involved in the commercial aspects of recovery.

When local law enforcement agencies do not have their own underwater investigative teams, they rely on commercial divers to determine several legal aspects of wrecks and to collect such evidence as is present. Law enforcement agencies outline the work and investigation they want the diver to conduct. The dive team captain should consult with police, local forensic laboratories and insurance agencies to outline objectives and procedures. It is then essential the divers work carefully to prevent disturbing the site until such information is obtained.

Once the vehicle has been located by appropriate search methods an inspection should be made to determine the nature and extent of damage to it. If possible, take underwater photographs of damage or make accurate sketches. Conduct a careful search around the car to locate all objects in the vicinity. Measure distances from the car. Buoy the location. Make a report to the police and then recover items as requested.

A careful search of the area around the vehicle should be made for valuables that may have fallen from the car. All papers found in the area, as well as all other objects, should be recovered. Such a search can be made even in water with no visibility by carefully feeling over every inch of the bottom. When any paper is felt it should be handled with care until it can

be taken or sent to the surface where it can be investigated and its value determined. One member of the dive team should receive all items sent topside and, after being listed and signed for, turn them over to the proper authorities.

After all preliminary inspection and recovery work is completed, preparations for hoisting the car should be made. Sometimes an automobile can be floated to the surface by the use of float bags or drums and slowly towed to shore or to a pier where it can be lifted by a crane. The car will be full of water and must be hoisted slowly to allow the water to drain. Otherwise the excessive weight will likely carry away slings or parts of the car.

Recovery of cars that cannot be floated to the surface must be done from the shore by a crane or auto wrecker and involves dragging the car more than actual lifting. It is advisable under these conditions to sling the lifting bridle in such a manner that the car will be rolled onto its wheels when the first pull is made on the hauling cable.

Cars, trucks and planes will not always slide or fall all the way to the bottom if they land on a sloping area. It is therefore imperative that a diver start the search for the vehicle at or near the water's edge and proceed deeper by carefully working a search pattern down the slope. *At all times remain on the high side of any object lying on a steep slope.* The object might roll or slide down the slope, possibly over the diver.

TRUCK/CARGO SALVAGE

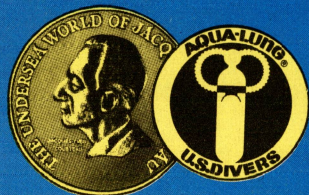
Submerged trucks and trailers are often badly smashed up and present extremely hazardous dive conditions. There are jagged metal edges and cargoes or vehicle parts that shift in the current. Seldom is visibility more than a few feet. The diver must make inspections, rig for salvage, and complete the actual recovery by sense of touch. A diver must be particularly alert to avoid entanglement, disorientation and entrapment. A carefully organized topside crew must be able to work closely with the diver(s). Usually this can be done by signals on a rope, or, if diver communication is available, the diver can use a full facemask that permits

(Continued on Page 36)

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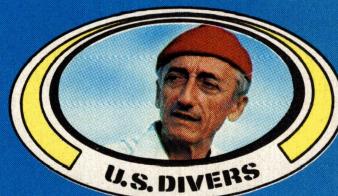


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Reflector Panels for fill in flash

Text and Photography by Jim and Cathy Church

If you're looking for a second light source for multiple lighting techniques, and can't afford a second strobe, try using a reflector panel for fill. It will probably cost less than five dollars, never needs new batteries and can't break down.

The idea is to place a sheet of white, reflective material near your subject, opposite the strobe. The strobe light strikes the reflector and bounces back. This is a fantastic technique for close-up underwater photography! Why? Because with a single light source, and f16 and f22 exposures, the shadow sides of many close-ups are too dark. But with subtle,

diffuse reflector fill lighting, the harsh shadow areas will be softened.

The white surface of a diver's slate can be used as a reflector. A 5 x 7 inch slate will be large enough for much of your Nikonos close-up work, and smaller slates can be used with 1:1 and 1:2 extension tubes. Just enough light will be reflected to soften shadow areas, but not enough to eliminate them. In some extreme situations, when we wanted to significantly increase the amount of reflected light, we had excellent results using a circular shaving mirror.

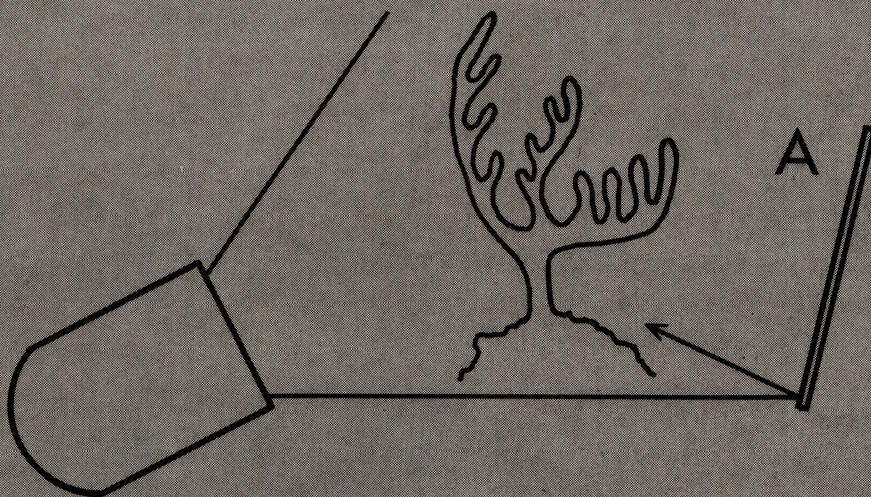
Learning to position the reflector at the proper angle is easy. All you have to re-

member is that the strobe light bounces off the reflector at the same angle it strikes it, but in the opposite direction. If the light hits the reflector at a 45° angle from the left, for example, it bounces off at a 45° angle to the right. Think of a pool ball bouncing off the side of the table and you've got the idea.

You don't, however, usually aim the strobe directly at the reflector. Rather, you often are reflecting only one side of the light beam. Thus, when estimating which way the reflector will bounce the light, you must think of the direction of that part of the beam angle you are directing toward the reflector.

TIPS ON USING REFLECTORS

The strobe doesn't need to be aimed directly at the reflector. In many cases, only one side of the beam is reflected. The light rays which strike the surface of the reflector (A) bounce off at the same angle, but in the opposite direction. Because light rays are striking the panel at an infinite number of angles, and because the panel surface isn't perfectly smooth, the reflected light is soft and diffuse.





Above, Cathy uses an underwater slate for reflector fill. In this case the slate is placed almost directly behind the featherdusters and the light reflects back behind them to soften the harsh shadow areas. Left, the delicate edges of the fire coral are sharply apparent when illuminated from behind. The near side of the colony would be dark without reflector fill.

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Above water, if you are working with reflectors outdoors or with photo floodlights in a studio, you can see how the light bounces from the reflector before you take the picture. But underwater, when working with the short burst of light from a strobe, you must guess. If you think about the angles before you take the picture, you'll soon develop a feeling for estimating them.

Begin with side lighting — the strobe on the left and reflector on the right — and experiment with different angles. If you find a frilly subject, such as a featherduster worm, that is high up on a piece of coral, you may be able to get the reflector or strobe down behind the subject for backlighting. Be careful, however, not to reflect light directly into the camera lens.

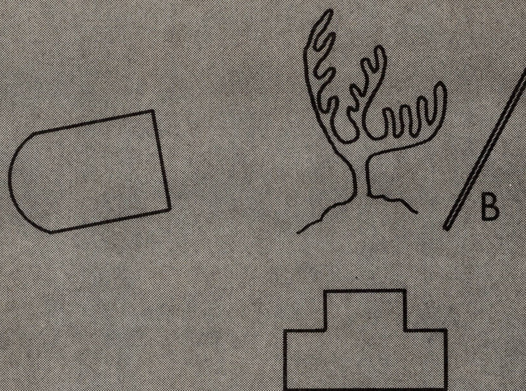
If you are using a Nikonos with a close-up lens, you may sometimes get the edge of the reflector in the picture. This is because you are looking down at the camera and aren't seeing the subject from the same viewpoint as the camera lens. You must be aware of the size of your picture area and get your eye close to the camera to see if the reflector is partly in the picture area.

Holding the reflector in place isn't as difficult as you might imagine. When using extension tubes, Cathy sometimes holds the rear of the slate (reflector) against the side of a Nikonos III with her little finger, with the front edge of the slate resting against the right upright of the extension tube framer. Sometimes she props the reflector up against dead coral or rock formations. In most situations, however, one of us holds the reflector for the other. For those who are mechanically inclined, a simplified adjustable arm or stationary bracket system might not be difficult to design and construct.

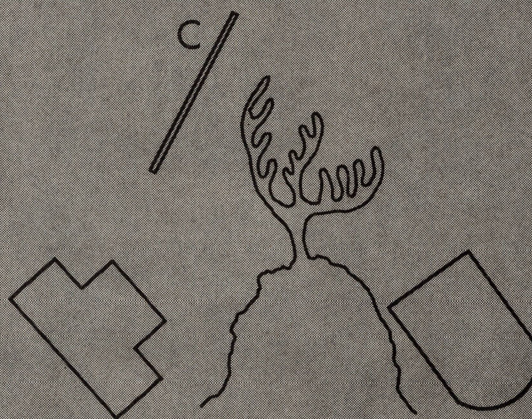
Exposures shouldn't be a problem. Because the panel reflects less light to the subject than the strobe emits, use the same apertures and strobe-to-subject distances as you would without the reflector. A possible exception, however, would be if you used a mirror. If both the strobe and the mirror direct light at the same subject area (not different sides), there might be a tendency to overexpose. Therefore, bracket by increasing strobe-to-subject distance (or closing the aperture).

Given these basics, you can now move on to even more creative reflector uses. A flexible reflector, that an assistant could bend into a curve, for example, could be used for fill lighting over a greater area of any given subject. Or, a small white plastic plate, with a shallow concave surface, would reflect more light into a close-up picture area than a flat reflector. And colored reflectors, of course, are an entirely new area.

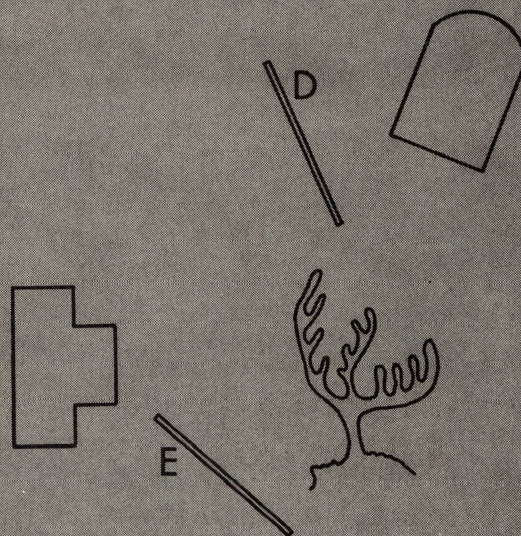
Now that you have the basic ideas, the creative part is up to you — do it! 



Although it is difficult to convey a three-dimensional concept with a two-dimensional drawing, the reflector (B) bounces fill lighting to the shadow side of the subject.



With the strobe placed behind the subject for strong backlighting, but hidden so the beam of light doesn't strike the lens, the reflector (C) bounces a touch of light to the near side of the subject.



When backlighting, one reflector (D) can be used to block the strobe beam so it doesn't strike the lens, while another reflector (E) bounces fill light to the near side of the subject. These techniques require an assistant.

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Film Festivals 'n Symposiums

NAUI UNDERWATER '81

The fall edition of the Underwater Film Review is scheduled for September 26. Produced for NAUI by Fred Calhoun, the show will screen at 8:00 pm at John Hancock Hall on Berkeley Street in Boston,



Massachusetts. The featured filmmaker will be Bill Lovin. Lovin has worked for all three major TV networks and numerous independent productions. His work has appeared in *Parade*, *Argosy*, *Wildlife* and *SKIN DIVER*.

Films to be presented are: *Bonaire My Love*, *Dive On The Monitor*, *Beneath The Killing Sea* and *Wild Places*. In addition there will be two slide presentations — *Underwater Photo Magic* and *Photography In Hostile Conditions*.

Tickets are \$4 and may be purchased in advance by writing to: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117. Make checks payable to NAUI. Tickets will be available at the door on the day of the performance at a slightly higher price. 🐠

PHOTO COMPETITION

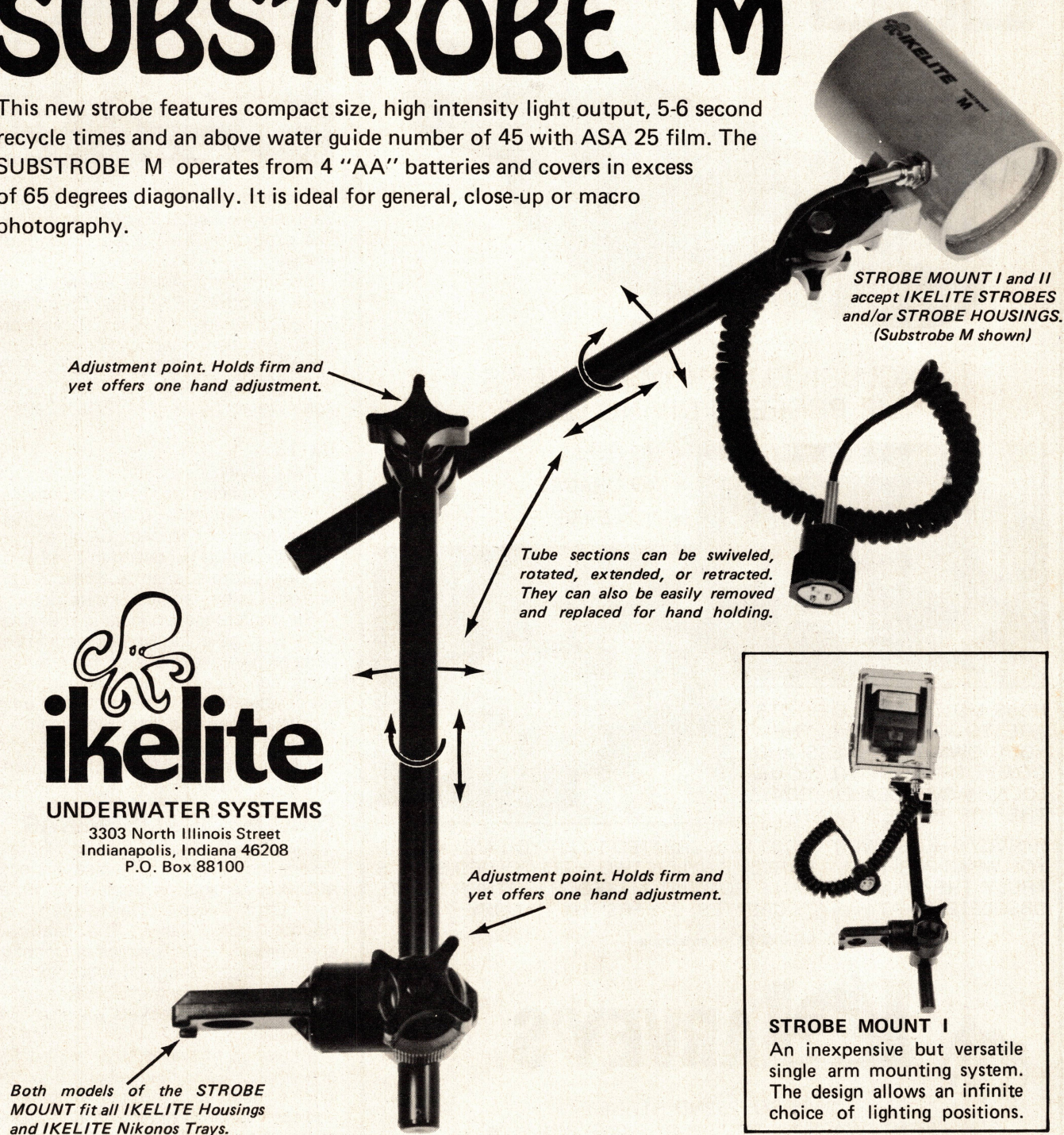
The Los Angeles Chapter of the Underwater Photographic Society is again sponsoring its International Underwater Photographic Competition. Entries from all over the world are invited in seven categories covering prints, slides, and movies. The entry deadline is October 10. Plaques will be awarded for first place, with medals going to second and third-place winners. A plaque and \$100 will be awarded for Best of Show. The entry fee is \$5 (U.S.) for each category. Further details and competition rules can be obtained by writing to: Steve Ioerger, Underwater Photographic Society, P.O. Box 7088, Van Nuys, California 91409. 🐠

THE OCTOPUS ARM

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SUBSTROBE M

This new strobe features compact size, high intensity light output, 5-6 second recycle times and an above water guide number of 45 with ASA 25 film. The SUBSTROBE M operates from 4 "AA" batteries and covers in excess of 65 degrees diagonally. It is ideal for general, close-up or macro photography.

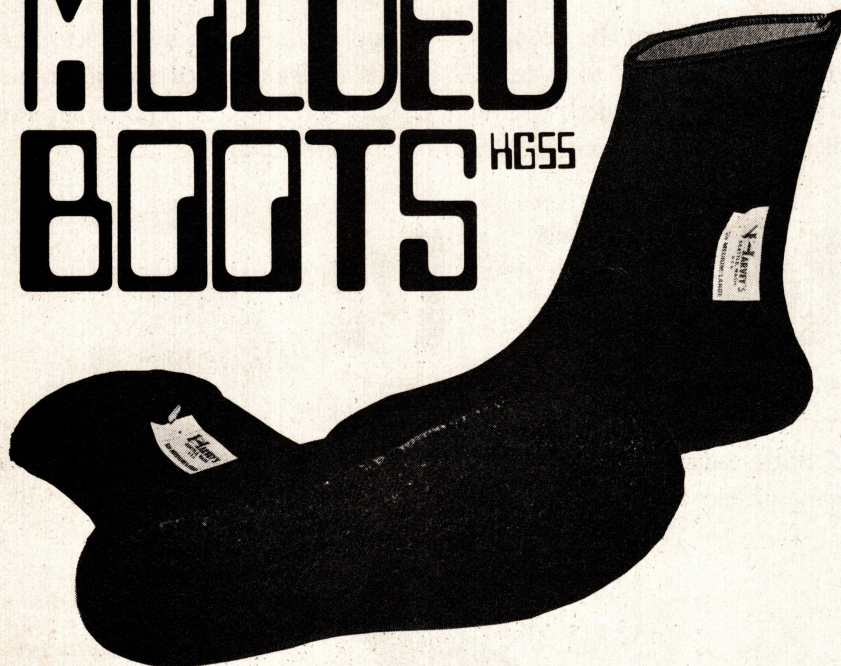


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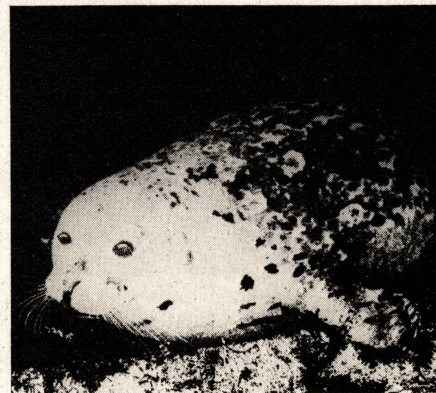
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UPS FILM FESTIVAL

The San Diego Underwater Photographic Society is pleased to announce its 17th Annual Underwater Film Festival



photo/Richard Rahe

to be held on Friday, August 28, and Saturday August 29. Exciting and different programs are to be held each evening.

The programs will be staged at the newly remodeled San Diego Civic Theater, 202 C Street, at 8:00 pm. Tickets are \$6.50 per performance. For additional information, or tickets, write UPS, P.O. Box 82782, San Diego, CA 92138, or call Zona Wahrenbrock (714) 273-1224.

IQ 12

NAUI Diving Association's well known International Conference on Underwater Education (IQ) will be held November 13, 14 and 15 in Toronto, Canada.

NAUI-Canada is hosting this year's IQ 12 and promises an action-packed weekend at the famous Skyline Hotel.

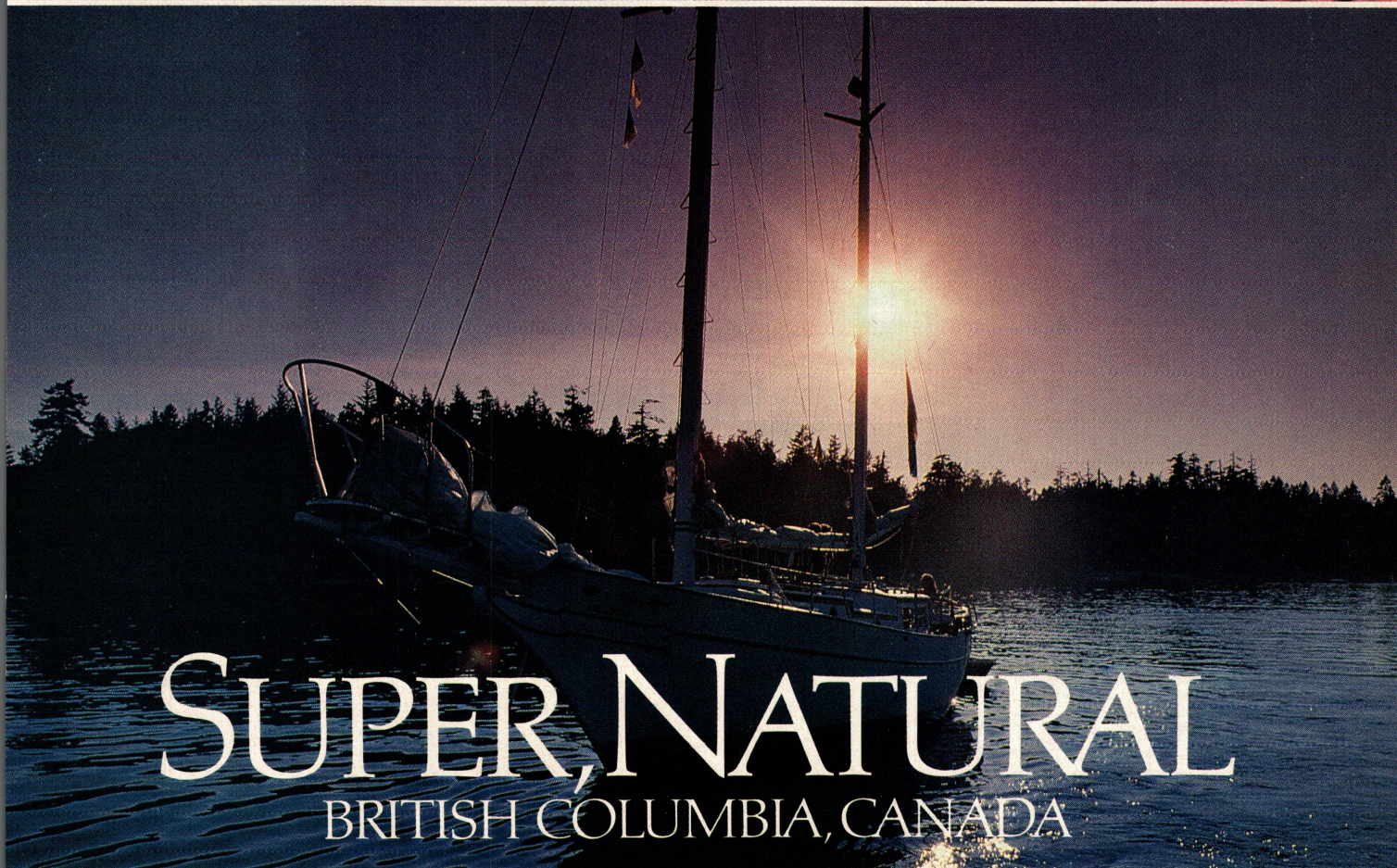
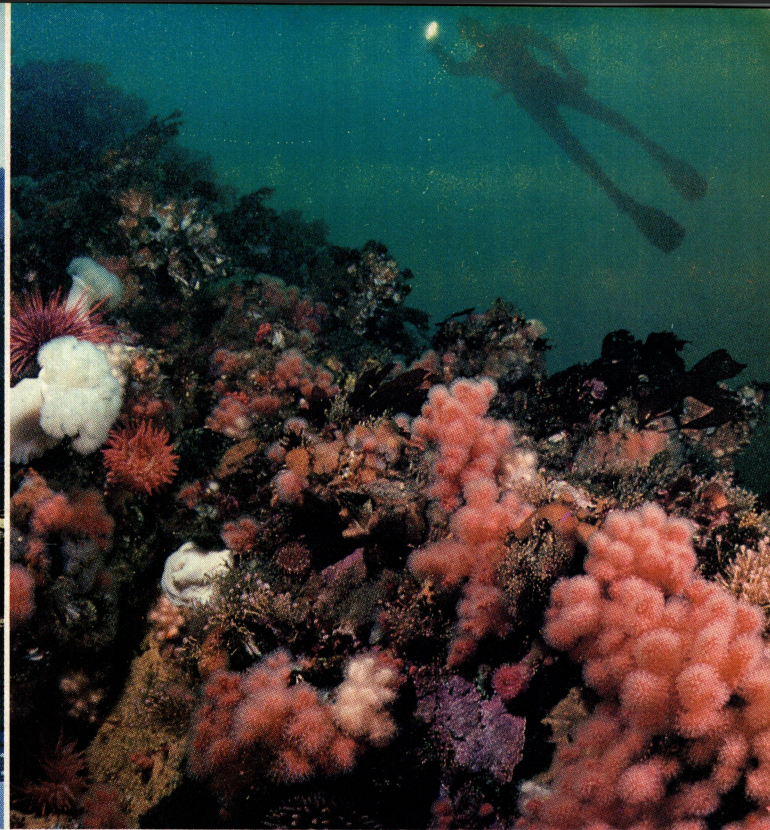
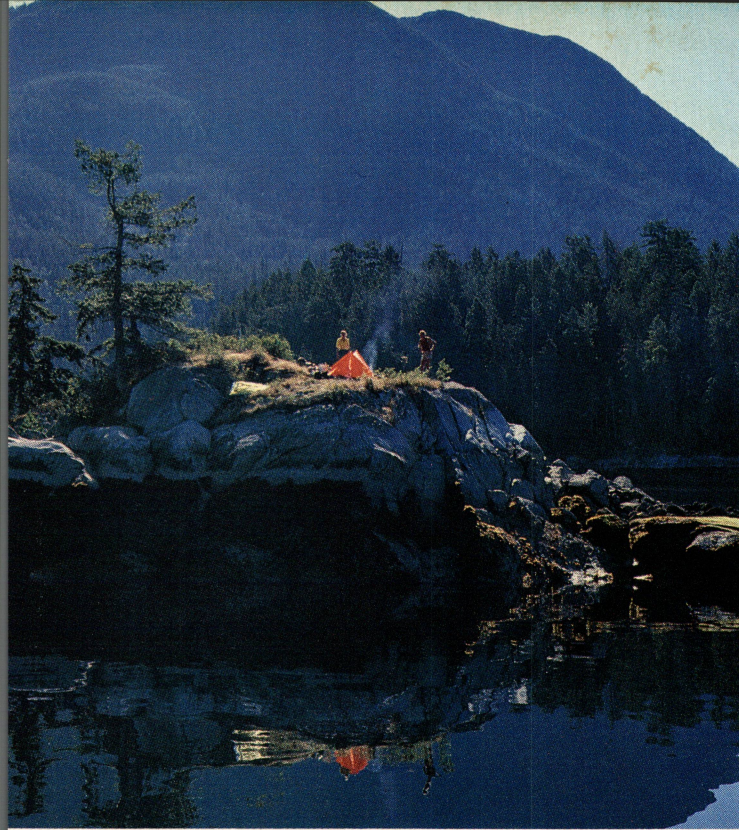
The conference will include presentations by some of the world's leading experts on diving, exhibits by major equipment manufacturers and two nights of underwater film presentations, featuring Stan Waterman and John Stoneman.

Details on IQ 12 can be obtained from NAUI-Canada, Box 510, Etobicoke, Canada M9C 4V5. Phone: (416) 677-3817.

OHIO MEDICAL SEMINAR

The Ohio Council of Skin and Scuba Divers, Inc., will host a Medical Aspects of Diving Seminar on September 19, at the Old Towne Restaurant in Reynoldsburg, Ohio. The featured speaker will be Dr. Thomas J. Doubt of the Diver Medic Program at the National Naval Medical Center, Bethesda, MD. Five other noted speakers will also give presentations.

Admission to the seminar will be \$5, and for \$9 (with reservation) a buffet lunch is included. For further information and reservations contact Art and Twink Miller, RR1 Kolter Rd., Spencerville, Ohio 45887; (419) 647-4835.



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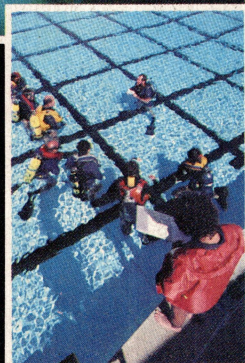
Fall splash. It could be the swirling colours on a winding mountain park trail. The reflection of a sail off Victoria's harbour. Or a dive into northern waters past legendary wrecks and close enough to witness the incredible Fall spawning of the Pacific Salmon. Fall packages here offer everything but the crowds, the hustle, and the expense of vacations farther afield. With exchange rates that up the value of your dollar. And sparkling city sights so close by. Take the plunge. In Super, Natural British Columbia.

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- ☐ Cozumel ITC (Sept. 19-26)

108

marin Solar U/W System



**Text & Photography by
Jim & Cathy Church**

The heart of the MarinSolar U/W system is an Osram Pm25 flash unit in a tubular, plastic housing. The housing can be hand-held or pressed into a quick-snap holder at either the left or right side of the camera bracket.

The Pm25 is powered by two AA cells and gives up to 150 flashes with a ten second recycle time. The ASA 64 guide number (feet/air) is 66. For apparent U/W feet, the ASA 64 GN would be somewhere between 18 and 26, depending on subject reflectance and water conditions. Color temperature is 5600°K, and the U/W beam angle is 60 degrees.

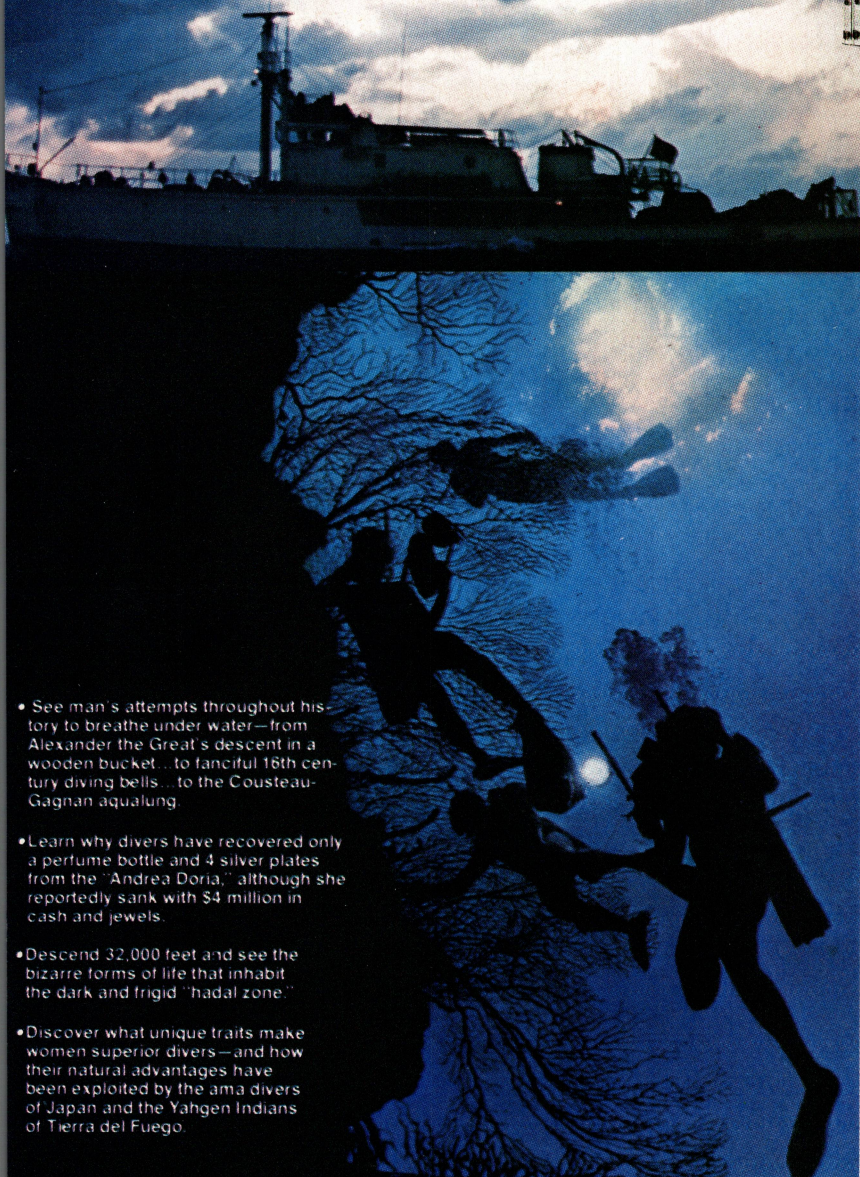
The housing has a circular filter pack that contains an orange conversion filter for blue tones, two neutral density filters and a light diffusing filter. Selection is made by revolving the pack. It can be installed or removed easily because it slips over the top of the housing. A direct-reading exposure meter is also available — it fits inside the housing, just

below the top end cap.

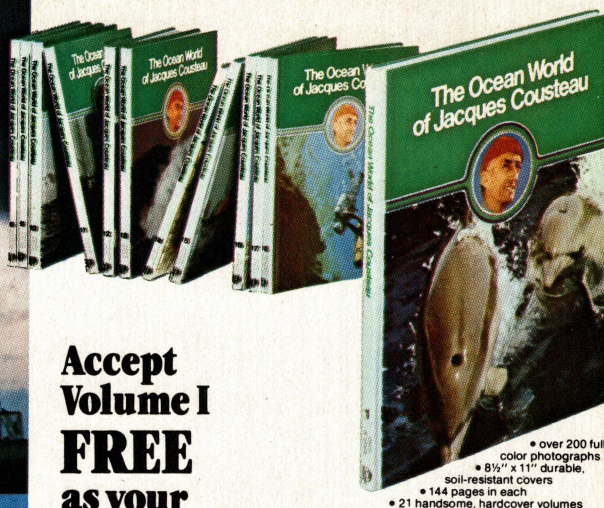
Cordless housings are available for adding one or more slave strobes to the MarinSolar system. The slave sensor is placed inside the housing in place of the exposure meter. A leg holster is available for carrying the slave housing, and small lead weights and a unipod are available for positioning the slave on the bottom. Another cordless housing holds the MarinSolar Pilot Light, a rechargeable with a 20 minute duration.

A wide variety of other U/W photographic products and accessories are also available. These include 3-D stereo lenses for the Nikons, U/W optical rangefinders for close-up photography and solar charger systems. Although we haven't tested MarinSolar strobes and other products underwater, the products appear to be versatile. For more information and prices, write to: Diversified Marine-Air Products Corporation, 4668 So. Yosemite, Englewood, CO 80111.

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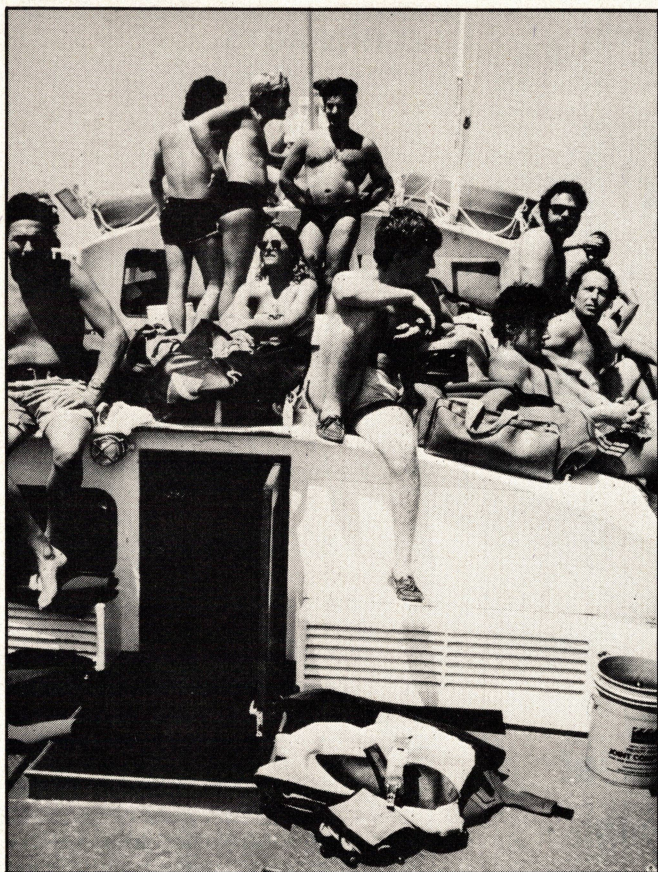
East Coast



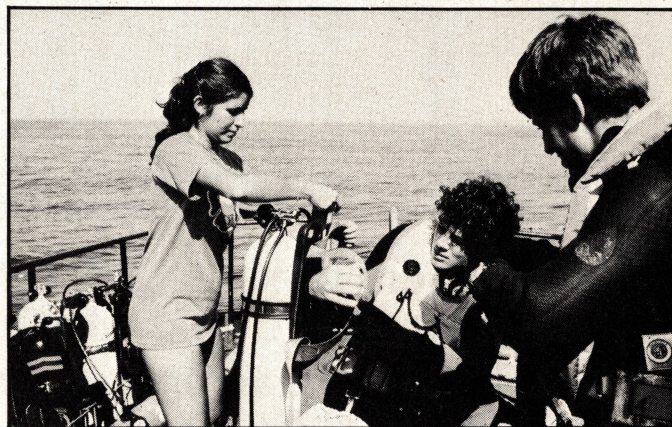
The first step to the *Iberia* wreck.

As I stood in the wheelhouse of the dive boat *Honest Archie*, I felt a twinge of nostalgia. Before me was the most beautiful sight in the world — an absolutely glassy calm sea four miles off the South Shore of Long Island. The sky was bright blue with a warm sun shining down on glistening, slick water. Beside me stood Captain Al Boehm, a dive buddy I had known for more than 20 years. It was like coming home after a long journey.

We were aboard the 59 foot steel hulled dive boat owned and operated by Central Skindivers of New York. The sturdy craft had originally been a crew boat for Louisiana offshore oil rig workers and had since been converted to a comfortable and durable dive boat. Equipped with twin 12 cylinder diesels, the craft can cruise at 24 knots and reach the furthestmost wrecks in record time. Every weekend, the *Honest Archie* carries groups of eager divers to more than a dozen different wreck sites scattered along the South Shore of Long Island. These sites include such fascinating and famous wrecks as the *USS San Diego*, luxury liner *Oregon*, *Stone Barge*, *Am-*



Left, time spent above water is not wasted as these divers soak up some sunshine. Above, Al Boehm, captain of the *Honest Archie* and a fellow wreck diver. Below, a friendly pre-dive assist.



Wreck Dive

Text and photography
by Paul J. Tzimoulis

Long Island's offshore shipwrecks can be as much fun as a trip to the tropics

broke *Lightship*, *Stolt Dagali*, *USS Turner* and others. It is one of the few regularly scheduled dive boat operations that provides East Coast divers an opportunity to sample some of the finest wreck diving adventure in the western hemisphere. Side-scan sonar makes wreck finding easy for the *Honest Archie*.

This day, we were anchored over the wreck of the *Iberia*, a small tramp freighter originally from Marseilles, France. The vessel had developed engine trouble on its way into the port of New York and was forced to anchor off Long Beach for repairs. On a foggy morning in November, 1888, the luxury liner *Umbria* crashed into the disabled cargo ship and sheared off 14 feet of the stern. Within 24 hours, the *Iberia* had taken on so much sea water that the bulkheads collapsed and the ship finally settled to the bottom. She now rests in 55 feet of water and has become a popular wreck dive.

After almost a century of submersion, the sea has taken its toll. The *Iberia* is no longer a ship as we know it, but instead, a jumbled pile of steel plates, bent piping and pieces of heavy machinery. It is an

underwater junkyard — a massive puzzle which the diver must piece together in his mind. The ship's boilers and drive shaft are still there along with piles of wooden boxes once filled with tropical dates from the Persian Gulf. While the underwater visibility may be murky by Caribbean standards, the wreck of the *Iberia* is still a thrill for any diver who seeks adventure and a glimpse of intriguing marine life. The wreck is loaded with all sorts of living creatures, including anemones, crabs, lingcod, bergalls, sea bass, and blackfish. There are even a few tasty lobsters for the diver quick enough to snatch one out of a hole. Like all the sunken ships in the North Atlantic, the *Iberia* is a haven for small marine life and beacon for the larger pelagics.

As I swam over the wreckage of the *Iberia* with Al Boehm and news columnist, Nick Karas, my thoughts went back to a day in 1963 when Boehm and I were joined in another shipwreck escapade. The East Coast dive community was in an uproar because a scrap metal company was making plans to blow up and cart away the magnificent wreck of the *USS*

San Diego. It was to be the first of many East Coast shipwrecks destined for total demolition. Boehm and other East Coast dive leaders banded together and formed a Save the Wrecks committee under the auspices of the American Littoral Society. They were soon joined by the powerful National Party Boat Owners Alliance, as well as other groups of fishermen and dive clubs. In the eyes of the fishermen and scuba divers, these offshore shipwrecks represented an extremely valuable natural resource as the wrecks were ideal habitats for dozens of different fish species. Boehm and the Save the Wrecks Committee put up such a strong fight and generated so much public opinion that the U.S. Navy finally withdrew its permits to destroy the shipwrecks.

Now, 18 years later, sitting on the stern of the *Honest Archie* and surveying a deck filled with happy wreck divers who had just enjoyed a visit to the *Iberia*, I could say, "It was all worth it." And as I looked over at Al Boehm's smiling face, I knew he agreed. East Coast wreck diving is still one of the great adventures. 

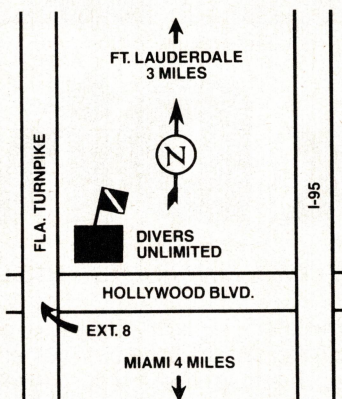
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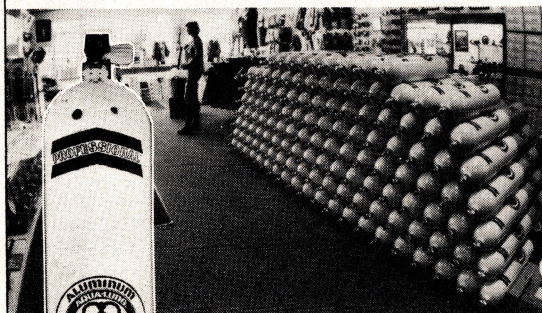


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TECHNIFACTS

(Continued from Page 22)

clear speech.

When divers must work inside large trailers or semi-trailers, a second diver should be utilized. Safety or buddy lines should be used between the two divers and from the tender diver to the surface. Also, divers must be careful to avoid building up an air pocket within the trailer that might cause it to shift or fall into a different position.

Trucking accidents nearly always involve interstate commerce and valuable cargoes. In such cases government agencies become involved. Representatives of the insurance agencies for the truck and cargo will usually want certain information. However, any physical material such as papers, parts of the wrecks, instruments, etc., should be turned over to law enforcement agency representatives. Written reports, photographs taken, sketches, and other matter that may become legal evidence should be handled the same way. A receipt for all such items should be obtained by the topside dive team representative. This will help establish a legal chain of evidence as well as to verify work the diver has done. Also, a receipt should be obtained for all personal items, belonging to the victims of the wreck, that are recovered.

PLANE WRECKS

A plane wreck presents special hazards and difficulties for a diver. A plane ditched under control is often damaged only slightly and can be worked on with comparative safety by a well organized dive team. A plane that crashed out of control will be particularly difficult to work around — there will be debris scattered over a wide area. Pieces of badly twisted, tangled, jagged metal and the ends of wire and metal parts can cut and entangle a diver unless the work is conducted carefully and methodically. When working on the recovery or salvage of a plane, hacksaws, heavy wire cutters, and bolt cutters should be handy.

The structure of a plane makes it quite difficult to rig float bags or lifting devices. Choker slings are usually possible and a viable method on the most difficult part, or parts. Rigging a plane for flotation or lift by a crane is on an extremely large scale, but otherwise procedures similar to those used in lifting a car will work. The dive team must be composed of enough qualified divers to cope with the extensive rigging work involved. Organization is even more important. Close cooperation with all topside officials becomes especially important owing to the magnitude and complexity of the project.

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Results — Qualified Divers

Our solution and its philosophy worked. Today, five years later, we are providing thorough comprehensive training to young men and women seeking to become professionals, at the same time we are providing ourselves with the services of well trained divers, supervisors and other categories of diving personnel in those that we hire to work at IUC.

International Underwater Contractors, Inc., and IUC International, Inc., have hired over 75%* of all graduates to date, and other companies have enthusiastically employed additional graduates. All

commercial diving firms appreciate the value of personnel trained by recognized companies who are in the business of diving as well as the field of diver training. Also, it is current practice at PDS to rotate all instructors to ongoing IUC commercial diving projects, such as offshore oil rigs. This program keeps the instructors current on state-of-the-art industry practices which they can then pass on in the classroom. The bottom line on all this, is that from the period of August '76 to December '80, over 95%* of Professional Diving School graduates were employed worldwide in the diving industry.

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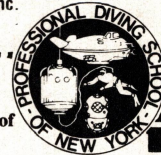
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The Subawider II

Wide Angle Adapter and Viewfinder

Text and Photography by Jim and Cathy Church



If you would like to get started in Nikonos wide-angle U/W photography, but have been stopped cold by the high prices of lenses, this report is for you! Let us introduce you to the comparatively low-cost system, the Subawider II Wide-angle Adapter and Viewfinder.

THE LENS

The Subawider II is a supplementary wide-angle lens that fits over the standard Nikonos 35mm lens. It widens the angle of view to about 90 degrees, which approximates that of a 21mm lens. The Subawider II can be used with any Nikonos, including the Nikonos IV-A.

The rear edge of the molded body is slotted so it can spread slightly to grip the Nikonos 35mm lens mount. When in place, it fits snugly without wobbling. The front edge extends about one fourth inch beyond the center of the dome port and forms a protective lens shade. Four corners are indented so the lens shade doesn't show up in the corners of your pictures. To be sure that these indentations are in proper position, align the slot at the upper rear of the Subawider II with the upper guide pin of the Nikonos lens.

THE VIEWFINDER

The optical viewfinder is furnished with the Subawider II lens. It has a molded, plastic body with optics corrected for U/W use. Frosted areas, at the top and bottom of the front port, mark the vertical borders of the picture area. We found these frosted areas (which admit light) to be distracting, so we masked them off with black tape. The sides of the viewfinder are the horizontal picture area borders. For use with the 35mm lens only, a rectangular outline is etched into the front port to show this smaller picture area.

With the rear port of the viewfinder pressed flush against your mask, you may not be able to see images clearly. However, with a few minutes of ex-



Each of these photos was taken with a Nikonos camera, using Ektachrome 200 and an Oceanic 2001 strobe. Both shots were taken at 3.5 apparent feet. The shot on the left was taken with the Nikonos 35 mm lens alone. The photo on the right required the 35 mm lens and Subawider II.

perimentation, you will soon find your optimum eye-to-viewfinder distance.

APERTURE AND FOCUS

Both aperture and focus are controlled with the Nikonos 35mm lens control knobs. Two decals, one for aperture and one for focus, are furnished with the Subawider II. You attach these to the outer surface of the Nikonos lens mount, so they fit around the control knobs. The decals will adhere well if you wash the metal lens mount with alcohol first to remove all traces of grease. Calibrate the scales by marking the control knobs with a spot of paint or label tape, as per the instruction sheet. The aperture scale shows all stops from f2.5 to f22; the focus scale shows distances from 0.25 meter (about ten inches) to infinity. The focus control knob must be turned past the limits of the focus scale decal for minimum focus or infinity. This can be confusing at first, but read the directions and you will learn how to use the scale quickly.

DEPTH OF FIELD

Wide-angle lenses provide more depth of field than the standard 35mm lens. This is because depth of field increases with

increased picture area as well as with smaller apertures.

A complete depth of field table is packaged with each Subawider II. At a focused distance of one meter (about 39 inches), and f5.6, the table shows depth of field extends from 2 to 12 feet. And at f22, from one foot to infinity. Moving in closer to a focused distance of 0.25 meters, and setting for f22, depth of field extends from about five inches to slightly more than two feet. Because the Subawider doesn't have a depth of field scale, you might attach one with a few basic aperture and distance combinations to the Subawider II body with label tape.

USING THE SUBAWIDER II

For best results, we offer these tips:

1. Attach a safety cord (not a carrying cord) to the hole at the bottom of the Subawider II body and tie a small loop at the other end. Run this cord under the camera body, up the back and place the loop around the viewfinder mount. Slide the viewfinder in place, and you have a safety cord without having to tie knots with wet fingers.

(Continued on Page 104)

WE'RE A LOT DEEPER THAN A DIVING SCHOOL:

C.D.C. is an integral part of one of the world's largest diving contractors... Oceaneering International, Inc., which is C.D.C.'s parent company and which has three out of five of the major deep water contracts, and the majority of the most expensive underwater exploration, construction, and maintenance projects. O.I. is heavily involved in over one-third of the world's oil platforms.

The fact is:

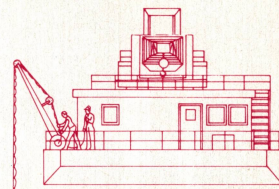
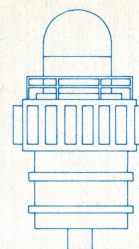
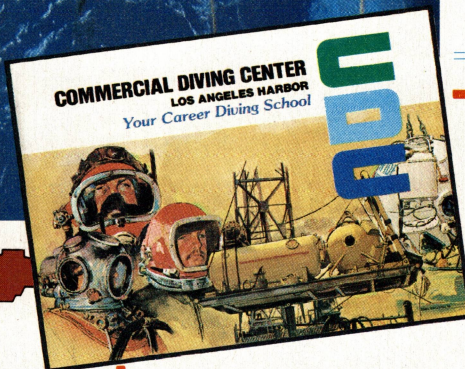
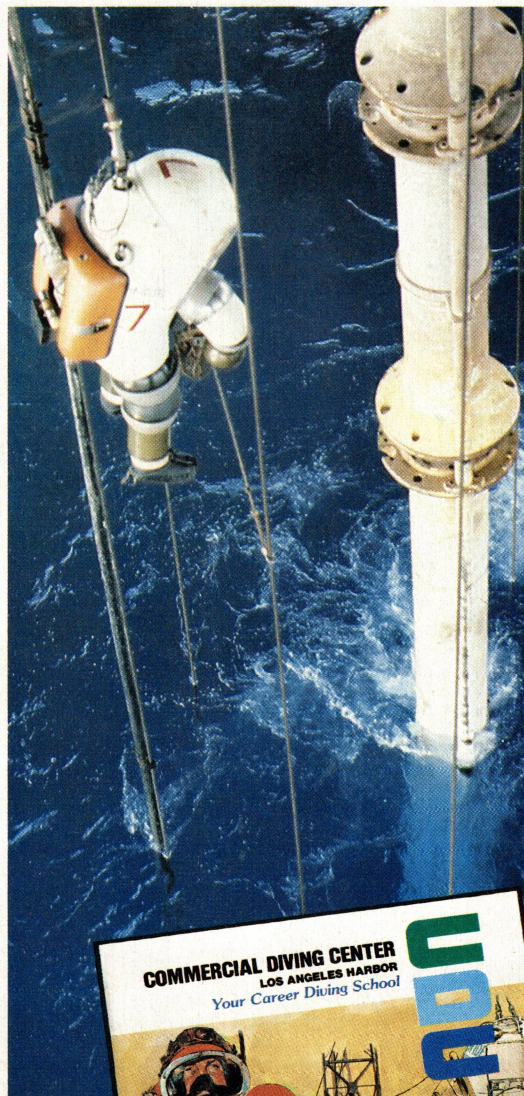
Oceaneering International designed Commercial Diving Center's training programs, moving over 40% of the graduates into key jobs under world-wide diving contracts. The others may opt to work for some 200 diving contractors who look upon C.D.C. as a producer of high-quality trainees ready to take on any job with any type of equipment.

The reason is:

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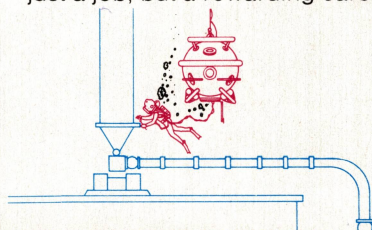
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Your scuba certification is just the beginning of a top career in the rewarding field of commercial diving. With Oceaneering and Commercial Diving Center, you can achieve the best of that world. Send for our big, comprehensive literature package. Compare us with others, what it will cost against what you will get. We're eager for you to make this comparison. In evaluating the differences, you'll quickly see that C.D.C. offers you not just a job, but a rewarding career.



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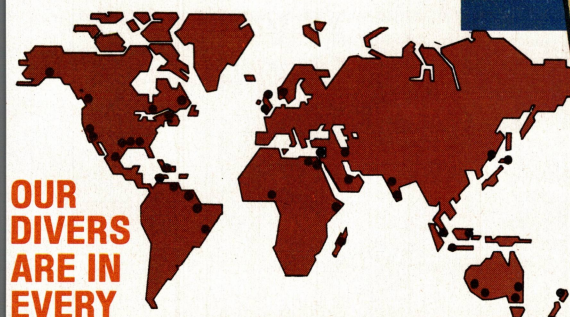
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The Giant Ground SLOTH

Divers discover and recover
Rare Remains of Florida's
largest creature

By Bill Barada



Above left, the fossilized bones of the
giant sloth were discovered in a water-filled pit under
excavation for fill material. Left, the huge
animal probably weighed over five tons.

illustration/Will Weston

The giant ground sloth (*Eremotherium mirabilis*), which grew as tall as 20 feet and weighed more than five tons, is the largest animal that ever lived in Florida. These monsters inhabited the coastal marshes and swamps of tropical countries about 150,000 years ago (Pleistocene Epoch), but their fossilized remains are so rare that, until 1980, only four specimens were on display in museums throughout the world. One is in Guatemala, another in Columbia, and two are at the Smithsonian Institute in Washington, D.C. — but these were imported from South America. Smaller species of sloths are more common but *Eremotherium*, the granddaddy of them all, is rare and highly prized.

The world's fifth specimen of giant sloth, the most complete and best preserved fossilized skeleton of this animal ever discovered, went on public display in November of 1980 — not in one of the world's prestigious museums — but in the tiny Daytona Beach Arts and Sciences Museum in Volusia County, Florida. This specimen, which has been called a major scientific discovery by such world renowned paleontologists as Dr. Gordon Edmond of the Royal Ontario Museum in Canada, is truly unique. It was not only discovered by skin divers (whose hobby is paleontology and archaeology) it was also excavated and preserved by skin divers — with the help of volunteers organized by the local museum.

The site of the discovery, now named the Daytona Beach Bone Bed, has produced portions of fossilized skeletons of at least 13 different sloths, plus the fossils of whole families of prehistoric camels, turtles, alligators, three different species of elephants and other animals. Also discovered were an ancient bed of thousands of huge, intact, clam shells, and the stumps and branches of trees and other vegetation that once flourished. The Daytona Beach Bone Bed has been ranked in importance with La Brea Tar Pits in California and its discovery has attracted worldwide attention. As a result, museum officials and local politicians are now basking in the glory of international recognition and the special building in which the giant sloth is displayed is proving to be a tourist attraction rivaling Daytona's world famous beaches and auto race track.

Official credit for the discovery is given to three men: Don Serbousek and Roger Alexon, both of whom are veteran scuba divers with a hobby of underwater archaeology and paleontology, and Steve Hartman, the curator of science at the local museum who is a newcomer to skin diving. Credit is also given to museum directors, local politicians and citizen organizations that pitched in to help raise money and enlist volunteers after the project was underway. But the truth is that

the giant ground sloth was discovered by amateurs, Serbousek and Alexon, and without their knowledge, perseverance and determination, the Daytona Beach Bone Bed would have been destroyed.

The behind-the-scenes story of the Volusia County giant sloth is a classic illustration of the important role that skin divers are playing in the fields of archaeology and paleontology and the vital nature of their contributions to our knowledge and understanding of past history.

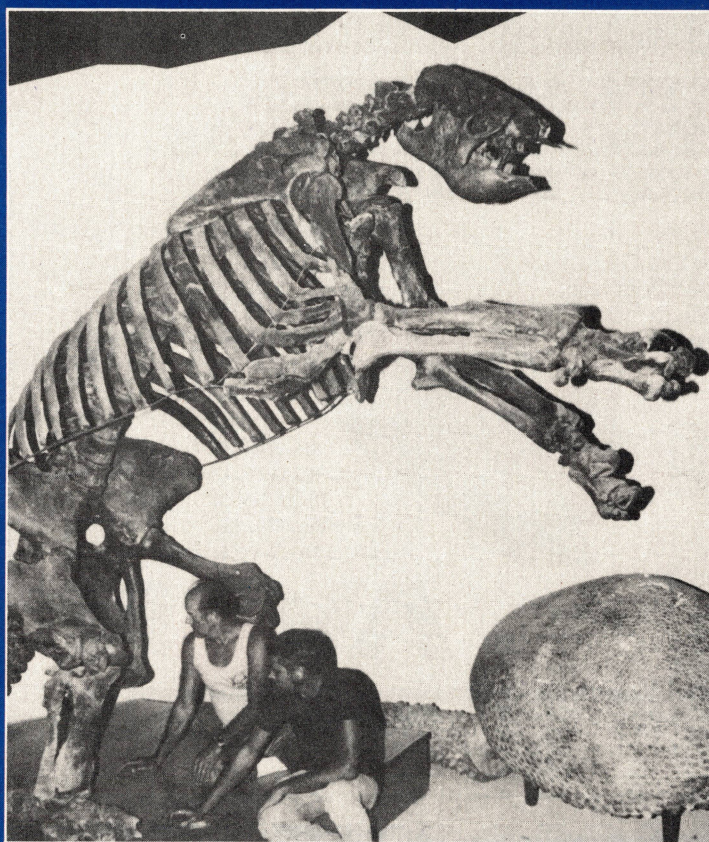
The discovery of a giant sloth in Florida was no accident. The story began in 1964 when Don Serbousek and his dive

toric fossils. There are other spots such as La Brea Tar Pits in Los Angeles which have more extensive concentrations, but in a large overall area, Florida has the most."

The abundance of these animals is incredible. The entire peninsula must have swarmed with strange beasts such as tremendous elephant-like mammoths and mastodons, huge saber-toothed tigers, giant lion-like cats, 1500 pound bears, camels, horses, rodents and hundreds of other species which have since vanished from the earth.

Fossils of these animals are being dis-

World's 5th specimen is most complete and best preserved



photos/Bill Barada

The skeleton of the giant sloth (an herbivore) dwarfs modern man.

buddy, Ben Waller, were looking for fossil bones in Blue Springs. Serbousek came up with four or five teeth that Waller, a highly respected amateur collector, identified as from a giant sloth. Serbousek says, "We called it a *Megatherium*. And, when Waller told me it was probably the largest and rarest prehistoric animal that ever lived in Florida, I decided I wanted to find an entire animal."

This is not as naive as it may sound. Dr. David Webb, paleontologist at the Florida State Museum states, "Florida is perhaps the richest area in the world for prehis-

covered by skin divers in Florida's lakes, rivers, sink holes, springs and swamps. Mixed with the animal bones are human artifacts such as utensils, pottery, tools and weapons. Also included in this prehistoric mixture are the fossils of marine animals such as: six inch long teeth of monstrous 50 foot sharks, massive turtle shells, strange fish, eels, sea shells and other sea creatures, many of which are discovered in inland sites far removed from any coastal areas.

A number of theories have been advanced to explain Florida's abundance of



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GIANT SLOTH

prehistoric fossils. Most scientists believe that a land bridge existed between South America and North America over which prehistoric animals — and possibly humans — migrated northward. As the rest of the continent became inundated with ice, Florida stayed warm and these animals could survive. The massive migration northward over a land bridge plus a southward migration away from encroaching ice produced a congestion of animals and humans that competed with each other for living space. When ocean levels began to rise, these animals were concentrated into smaller and smaller land areas. A series of submerged reefs off Daytona Beach at depths of 80, 60 and 40 feet mark the boundaries of ancient shorelines that are now submerged. As the land bridge became inundated, escape routes to the south were cut off and the existence of inland marine fossils show that the entire Florida peninsula was alternately below and above water as ocean levels rose and fell.

Thus, Serbousek had little doubt that a complete skeleton of a giant sloth existed somewhere in Florida and the chances of finding one were good if a diver spent enough time underwater and knew what to look for. Unfortunately, vast amounts of Florida's prehistoric treasure have been destroyed by local, state and federal agencies in their effort to drain, dredge and channelize virtually every river, stream and swamp in the state. Mountains of fossil bones and Indian artifacts, unearthed by draglines and dredges, were simply hauled away and destroyed in rock crushers.

Serbousek learned that dredging and excavation projects were prime sources for fossil bones and he began checking with dragline and dredge operators all over the state. Whenever bone material was discovered he and other divers engaged in a race to find and excavate the artifacts before they were destroyed forever. The divers worked as individuals, on their own time and at their own expense, with no help or encouragement from local, state or federal officials. In fact, the Florida Archives and History Act, which was passed in order to give the state control over treasure hunting, makes it illegal for anyone to search for or recover any old stick, bone, rock or other object "of interest to the public" without a prior contract with the Board of Archives. Thus, according to this law, amateur collectors such as Don Serbousek, Ben Waller, Roger Alexon, Pop Taylor and hundreds of other highly respected amateur paleontologists could be prosecuted as criminals.

The idea that only professional archaeologists and paleontologists should be allowed to search for and recover his-

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toric artifacts and fossils is ludicrous since these scientists have consistently displayed a strong aversion to searching for such objects. In rare cases the professionals will move in after a major find has been discovered, but very few professionals have ever engaged in an underwater search for fossil artifacts in Florida. This is probably because of the unappealing conditions under which such searches are made.

An example is the Oklawaha River which was being destroyed by the U.S. Army Corps of Engineers in preparation for the infamous Cross Florida Barge Canal. This is a beautiful stream that meanders through the jungle-like swamps and marshland of central Florida. The water is stained chocolate-brown by tannic acid, is infested with alligators and poisonous snakes, and the bottom is riddled with invisible sink holes, springs and siphons which divert a portion of the river water into underground caverns. Serbousek and Waller spent hundreds of hours exploring this river bed, utilizing the safety technique of floating backward downstream with the current. Serbousek states that floating feet-first, "prevents us from bashing headfirst into log jams and getting tangled in brush. We were always headed in the direction we entered so we could pull ourselves back out against the current without turning around. This was a lifesaver a couple of times when we were sucked into a siphon and had to claw our way back to the opening by digging in with our fingers."

Many of the Oklawaha sites are now buried, but thanks to Serbousek, Waller and other amateurs, hundreds of priceless artifacts were salvaged ahead of the bulldozers and draglines.

Serbousek's search for a giant sloth took him into isolated rivers throughout central and north Florida. It is ironic that it could have ended in 1965, one year after he and Waller found their first sloth fossils. But the importance of his discovery was not officially recognized until 10 years later. The original discovery came as the result of a TV talk show on which Serbousek was a guest. A dragline operator phoned to ask if he would be interested in some "dinosaur bones" his rig had uncovered. The dinosaur bones turned out to be the skull of a giant sloth which came out of a water-filled shell pit under excavation for fill material. Serbousek says, "I used scuba to scratch around in places the dragline had been working. The water was full of cattails, weeds, dead lilies, and the muck of decaying vegetation; so I couldn't tell the exact location of the bone bed. The few bones I found were embedded in the vertical wall of the pit 15 feet below the layer of shell material and 12 feet beneath the surface of the water. Much of the bank had already caved in, and trying to undermine the bank by excavating underwater would have been suicidal."

But by 1967 his scratching around produced enough sloth bones to warrant a trip to the Smithsonian — where Dr. Clayton Ray confirmed them as giant sloth fossils, some of which had never before been seen. Serbousek's bones were from five different animals. The significance of this was exciting. Only four *Eremotherium* skeletons existed anywhere in the world and none of these were complete animals. The two displayed at the Smithsonian consisted of 20 to 30 percent original bone — the rest was plaster — and the bones used were from several different animals. Thus, Serbousek realized he may have hit a jackpot containing more giant sloth skeletons than had previously been found worldwide.

Professional paleontologists confirmed the potential value of the discovery. Dr. Gordon Edmond visited Florida and offered to purchase the site, but when Serbousek learned that all bones recovered would be taken to Canada for display at the Royal Ontario Museum, he refused to tell Edmond where the bone bed was located. "This animal lived and died here," said Serbousek, "and this is where it should stay."

Serbousek also contacted the Smithsonian, Florida State Museum and many others. All were interested, but none had sufficient funds. So the bone bed lay idle and its treasure remained undisturbed until the shell pit was put up for sale. Serbousek was concerned that a new, uncooperative owner would destroy the fossils. He tried to talk his family into buying the land, but, "They thought I was crazy."

The dormant period of the bone bed ended when Volusia County bought the land and began excavating the shell material for use on roads. Serbousek obtained county permission to collect fossils at the site, then arranged with the dragline operator to phone him whenever bones were uncovered. Serbousek said, "The operator was cooperative and I obtained a lot of material by collecting from the dragline bucket. But several truckloads of bones had already been hauled away to the rock crusher."

Serbousek's dragline bucket collecting continued until one day in 1975, ten years after he first discovered the site. Volusia County had drained the shell pit and he found exposed fossil bones sticking out of the mud at the base of the wall.

The drained pit simplified fossil excavation, but complicated things for Serbousek because his secret was soon discovered. His close friend and dive partner, Roger Alexon, an amateur paleontologist who had worked with Serbousek to recover the complete skeleton of a prehistoric elephant from the Aucilla River, was the first to discover Serbousek's site. Alexon spotted a giant leg bone sticking out of the drained pit and phoned Serbousek about it. Alexon said, "Divers jealously guard the location

of their finds because they are afraid other collectors will raid their site. At first we talked in general terms, feeling each other out. But it didn't take long before Serbousek told me he knew where the pit was and was very much aware of what could be in it."

Alexon and Serbousek agreed to work together and to try to involve the local Museum of Arts and Sciences in an effort to keep the fossils in the county. Alexon contacted Steve Hartman who worked part time as the museum's curator of science and Steve agreed to go along with their project for the experience.

Hartman admits that he didn't know what he was getting into. Alexon and Serbousek had introduced him to scuba diving and taken him on several previous fossil hunting expeditions, but he had no knowledge of the potential of the Daytona Beach Bone Bed. Hartman says, "I was amazed that virtually nothing but sloth bones were being recovered and the quantity, barrels and barrels of fossils, made me realize that we were into something important."

The three reached a gentleman's agreement in which the local museum would sponsor the project and obtain the first complete sloth — Serbousek would get the second sloth plus any others — and Alexon would get all elephant fossils, (his pride and joy), plus first choice of any other animals. The bones were excavated by washing away the overburden with hydraulic jets, then groping for them in the mud and water. But escalating costs (above \$100,000) threatened to kill the project. A special museum building was needed to display the mounted skeleton and the professional work required to prepare the fossils for mounting had to be paid for. Hartman said the museum's board of directors were no help and considered the fossils just a bag of bones, not realizing their value.

This attitude changed dramatically, and financing problems were solved after Hartman, Serbousek and Alexon appeared on a local TV show. They announced a major scientific discovery and described the prestige a giant sloth on display at the local museum would bring to Volusia County. Civic organizations picked up the project and ran with it. Funding commitments flowed into the museum and a host of volunteers showed up at the shell pit to help excavate fossils.

The problem of assembling, treating and mounting the recovered sloth fossils remained, however. Serbousek states, "I tried to get museums involved. Dr. Gordon Edmond of the Royal Museum of Ontario and representatives of the Smithsonian visited the site several times. But only the Canadian museum offered any cooperation. He finally signed a contract with the Canadian museum in which they would get all other sloth bones if they agreed to assemble and mount two com-

(Continued on Page 109)

New Gear



1



2

1 Backpack — Features a nylon-flex tank band for easy packing. A stainless steel quick-release buckle ensures a secure fit on your tank. Includes three extra large carrying handles and strong nylon harness buckles. High-density polyethylene. \$49.95. From SeaQuest, 722 Genevieve St., Solana Beach, CA 92075.

2 Diver's Tool — The Q-Tool is handy for the spearfisherman or wreck diver. Made of stainless steel and colorful ABS plastic, it's an ideal line cutter and general purpose utensil. The separate scissors and double-bladed knife can be withdrawn for safety. Adjustable lanyard. \$6.95. From Aqua-Craft, 7992 Miramar Rd., San Diego, CA 92126.



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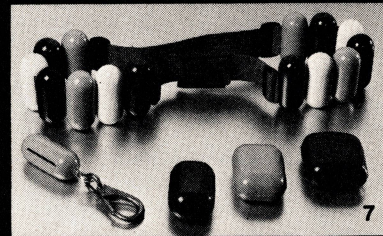
3 Wetsuits — Excitingly styled with colorful stripes across jacket and cuffs, these suits are made of color-fast 70 percent nylon and 30 percent Lycra spandex. Extra features include zipperless wrists and ankles, and protective knee pads. Men's \$326, women's \$332. Parkway Fabricators, 241 Raritan, S. Amboy, NJ 08879.

4 Watertight Box — The custom foam liner inside this case is die cut into squares which can be easily removed to snugly fit your camera or other gear. Transport your fragile equipment inside this airtight, padded, protective box. \$15.95. From Pelican Products, Inc., 23763 Madison Street, Torrance, California 90505.

5 Inflatables — Dinghies offer extruded aluminum channels to secure their optional wood floors. Large inflated thwarts provide 115 lbs. of buoyancy. Rovers offer solid transoms which allow the use of larger outboards. Dinghies start at \$1050; Rovers at \$1235 (prices effective through Sept.). Available from your nearby Avon dealer.



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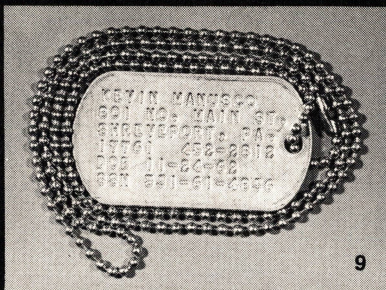


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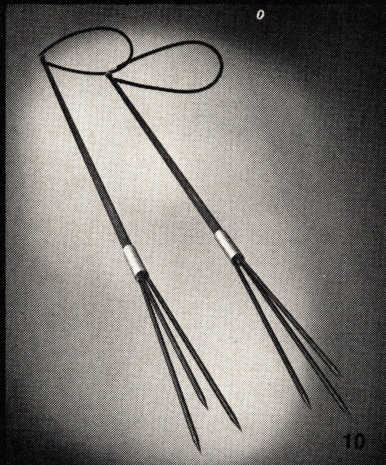
6 Dive Flag Medallion — Let others know you're a diver with this hand polished, red and white stone in a handsome brass setting with chain. For men and women. For evening or daytime wear. The medallion is available in silver and gold for \$19.95 and \$29.95 respectively. Superior Designs, 1100 S. Main, Lombard, IL 60148.

7 Vinyl Coated Weights — Reduce wetsuit chafing caused by exposed weights and color coordinate your scuba gear at the same time. Contoured, they are now available in three, four and five pounds. The weights come in blue or orange. Starting at \$11.95. From Aqua-Craft, Inc., 7992 Miramar Road, San Diego, CA 92126.

8 Pool Alarm — This sonic pool alarm emits a piercing warning when it "hears" someone in the water. It can tell the difference between a ball and a child, so false alarms are eliminated. The Life-line Pool Alarm can be heard behind closed doors. \$230. From Sound-Wave Systems, 3001 Red Hill Ave., Costa Mesa, CA 92626.



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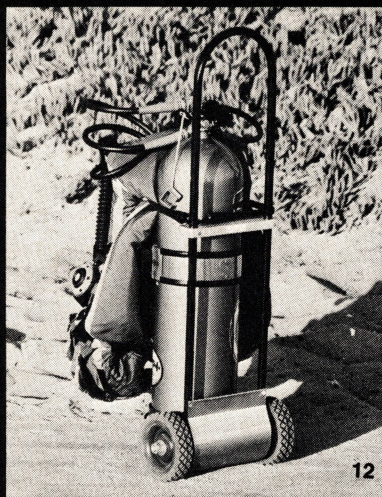
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9 Dog Tags—Vital personal and medical information is conveniently located on this durable military-style identification necklace. The American Medical Association's internationally recognized emergency symbol is located on the back. \$3.50. From Richcraft Products, Inc., P.O. Drawer 125, Kershaw, SC 29067.

10 Spear Poles—Made of one-half inch diameter solid fiberglass and available in two lengths, these spears feature three pronged paralyzer tips. The prongs are individually mounted in the aluminum head for strength. \$17.50 (5' length), \$18.95 (6' length). From AMF Mares, 722 Genevieve St., Solana Beach, CA 92075.

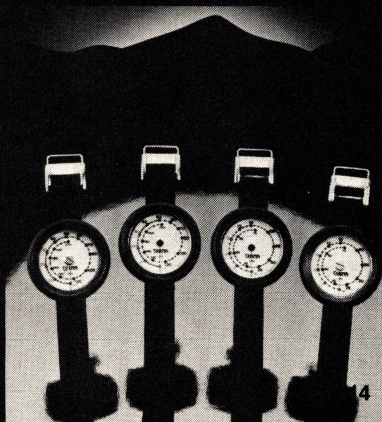
11 Flares—Wax coated and sealed in an airtight, floatable poly bag, these emergency signals come in three models. The daytime kit contains three 50 second smoke signals. The day/night kit contains three two-minute, 500 candle-power flares. The deluxe kit contains both. From \$13.95. Bristol Flare Corp., Box 540, Bristol, PA 19007.



12



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12 Diver's Tote—Provides instant transportation for your scuba tank, BC and regulator, to the dive shop or your favorite dive site. This unit will transport your equipment over steps, curbs and sand. When not in use it stores your equipment at home, conveniently organized. \$54. From Diver's Tote, P.O. Box 1173, Torrance, CA 90505.

13 SOS Pendant—A stylish way to keep personal and medical information handy. The pendant features a screw-off locket containing a chart for recording name, address, telephone number, blood type, allergies, medications, etc. Tough and waterproof. \$5.95. From Cramer Creations, 5050 La Crosse Ln., Madison, WI 53705.

14 Depth Gauges—Available in metric and standard versions with maximum depth indicator as an option, this gauge features an expanded, 180° depth scale between zero and 50 feet. The expanded scale and accuracy of this instrument allow precise depth readings. \$69.95, Max Depth \$74.95. From Tekna, 3549 Haven Ave., Menlo Park, CA.



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15 Sand Belt—Reduce discomfort and wetsuit chafing — replace your lead weightbelt with a contour-adapting, sand-filled belt. When full the GETLO (Get The Lead Out) belt will neutralize up to 20 pounds of buoyancy. \$29.95. GETLO belts are distributed by Wessner Design Co., 1932 Fell St., San Francisco, CA 94117.

16 Dive Watch Catalog—The full-color, four page pamphlet features Heuer's quartz and automatic movement dive watches in a variety of styles. Available with a black or luminous orange dial, all watches are water resistant to 660 feet. \$185 to \$500. From Heuer Time & Electronics Corp., 960 So. Springfield Ave., Springfield, NJ 07081.

17 Ear Drops—This medication has been designed to reduce the pain and inflammation associated with external otitis — swimmers ear. The drops come in an unbreakable dropper bottle, small enough to be carried in a pocket, purse or first aid kit. \$2.19. From Republic Drug Co., Inc., 175 Great Arrow, Buffalo, NY 14207.

The Blue-Blotched Butterflyfish

(*Tetrachaetodon plebeius*)

In Australia butterflyfishes are often called coral-fishes, and the bright little fish commonly called the blue-blotched butterflyfish is also called the two-spot coralfish. Both names are in reference to the large, irregular, violet-blue blotch on the side of the fish which resembles a smear of paint and which is the chief identifying characteristic of the fish. The blue-blotched butterflyfish is common along the entire Great Barrier Reef of Australia to as far south as Moreton Bay, and it is also found in the Coral Sea. The scientific species name *plebeius* is a Latin word for common. □ The word chaetodont means bristle tooth. This is the morphological characteristic which butterflyfishes share and is the source of their scientific family name Chaetodontidae. The bristle or hair-like teeth serve to filter their food, which consists primarily of tiny invertebrate animals such as polychaetes, anthozoans, sponges and coral polyps. The Chaetodontidae is a large family of fishes worldwide. Many ichthyological references include the angelfishes within the family, dividing one family into two groups, Chaetodontinae (butterflyfishes) and Pomacanthinae (angelfishes). There is evidence, according to a 1963 nerve study of the fishes, that the angelfishes and butterflyfishes should not be placed within the same family and that they may not even be closely related. Therefore, some ichthyologists prefer to separate the families. □ Butterflyfishes are easily identified by both physical and behavioral characteristics. They flit along the reefs, often in pairs, just as airborne butterflyfishes do. If one mate goes a certain distance ahead of the other the one behind will

hurry to catch up, almost as if they were attached to each other by a rubber-band. Sometimes butterflyfishes congregate in big schools but more often they will be seen alone or with one other mate. The common physical characteristics of the butterflyfishes are obvious and can usually be found on all individuals around the world. They all have flat, round, pancake-thin bodies and tiny, pointed mouths which are well adapted for picking their food from small cracks in the reef. The more obvious characteristics are the dark stripe through the eye and the presence, usually, of a dark spot on

or near the tail. The eye stripe and tail spot are Nature's clever camouflage to help the butterflyfish escape predators. To the pursuer the large spot appears to be the eye of the butterflyfish while the stripe conceals the true eye. Calculating the movement of the butterflyfish by the direction it seems to be swimming, the predator can make a

lunge at the wrong end and the butterflyfish gets off free. □ The butterflyfish has another good defense mechanism in its battery of sharp dorsal spines. These can be spread forward. Butterflyfishes have been seen with missing or broken dorsal spines and it might be assumed that the spines had been used to discourage a predator. □ The tail spot of the young blue-blotched butterflyfish is very black, margined with white, and all individuals of the species have the black eye stripe margined with pale blue or white. In this species the bright yellow body has dark streaks which run along the scale rows. The fish grows to a maximum length of four and one-half inches. In death, the large blue blotch turns black. 

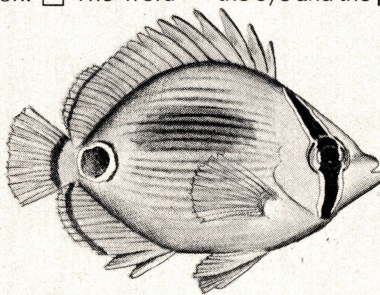


Photo By Carl Roessler - Text By Hillary Hauser

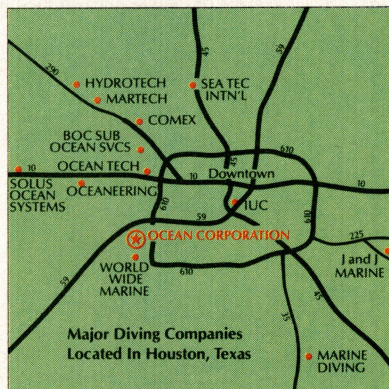
The photo was taken in 35 feet of water on Marion Reef in the Coral Sea. Roessler used a Nikon F in a Niko-Mar housing, Bauer E252 strobes in Farallon/Oceanic housings. F16, 1/60 sec., 18 inches from subject



Why Houston?

BECAUSE

The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible...

because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.

BECAUSE

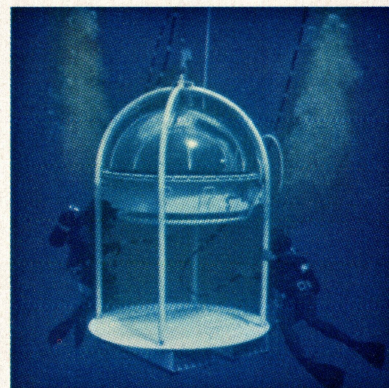
The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size



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Corporation, Larry

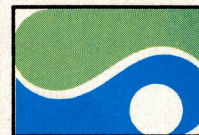
Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



The Ocean Corporation

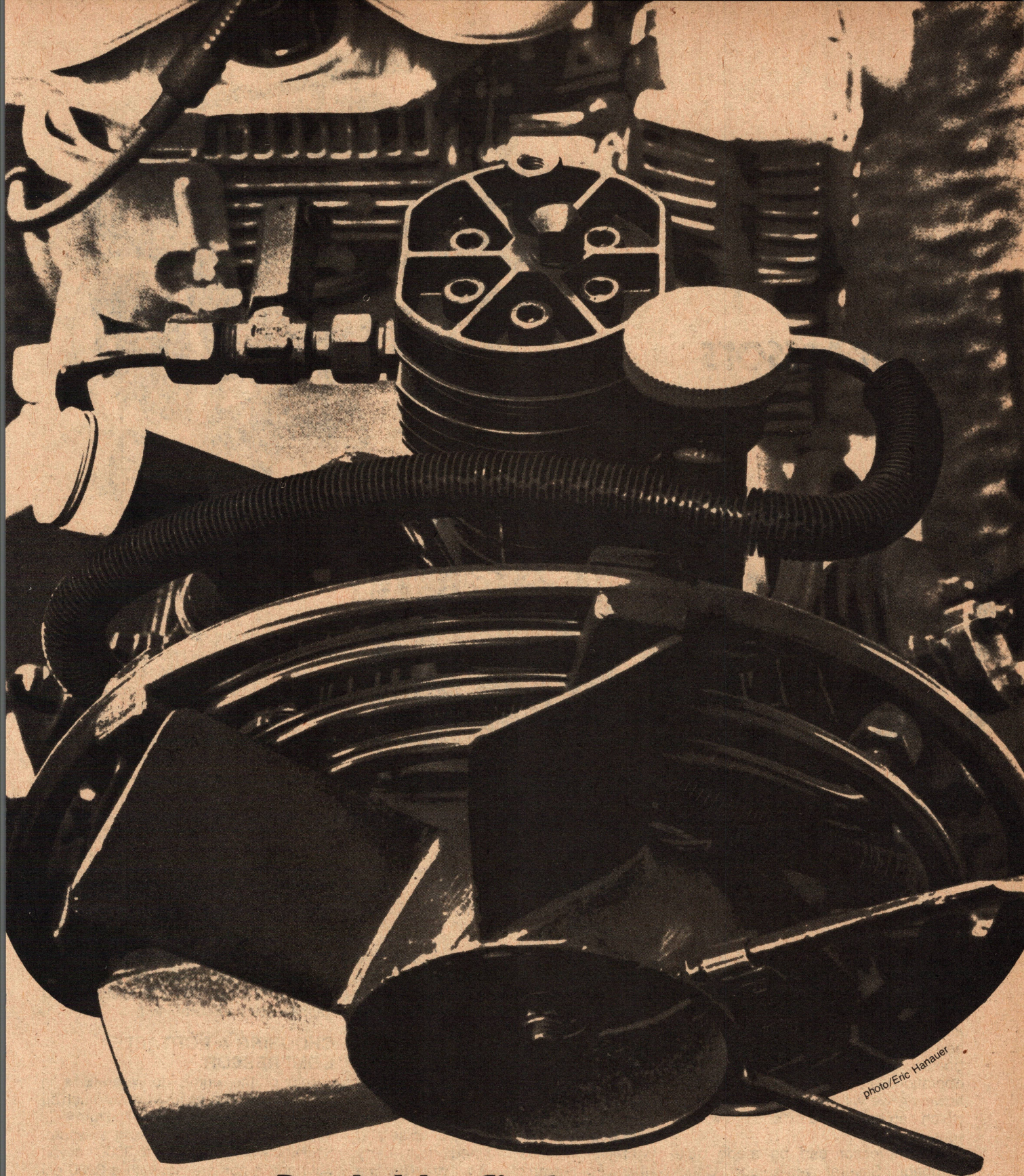
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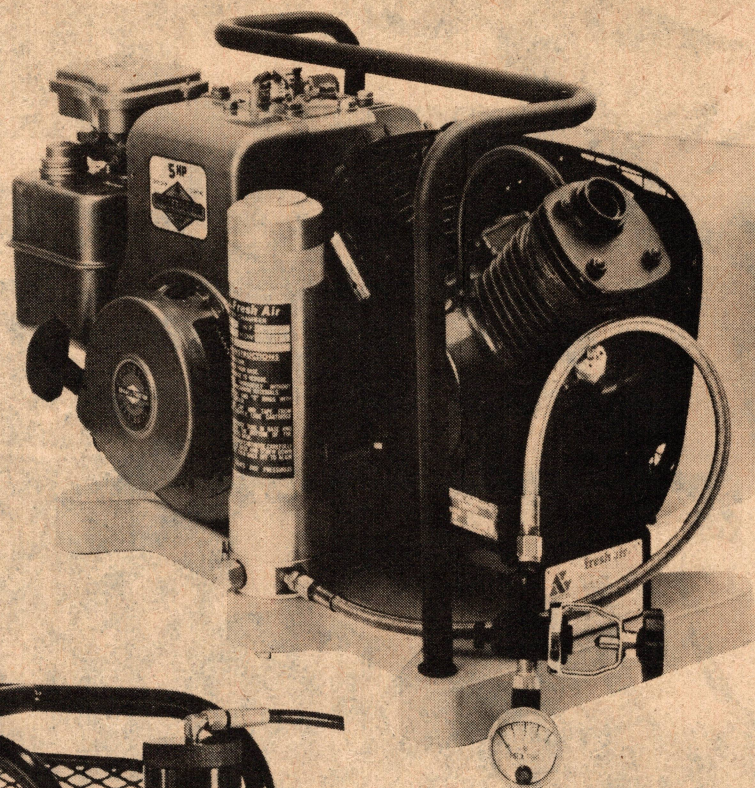


photo/Eric Hanauer

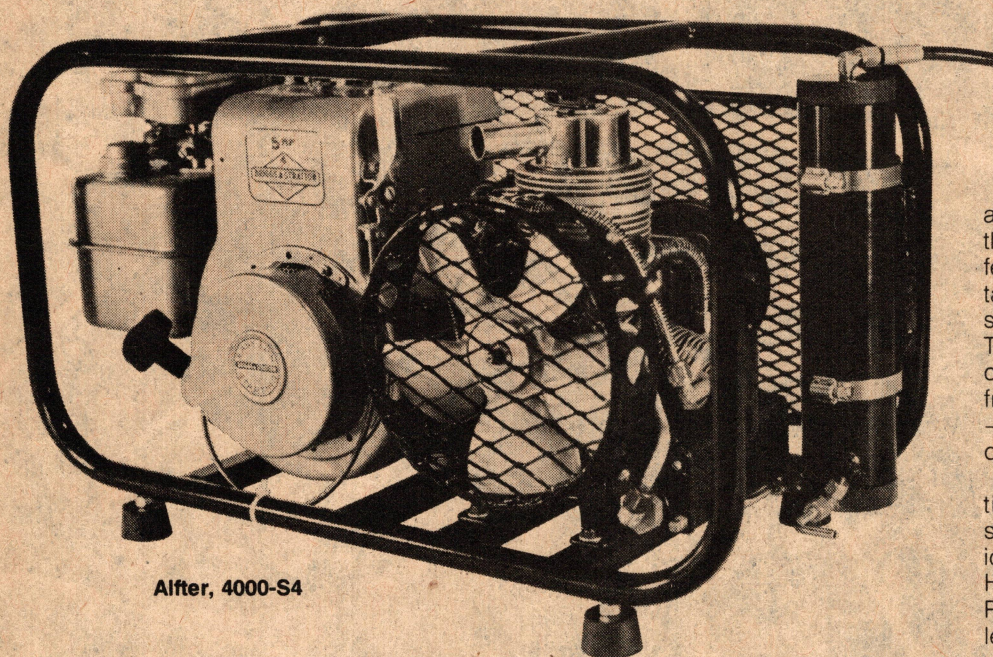
Portable Air Compressors

Lightweight air machines
let you expand
your underwater world
by Eric Hanauer

Portable Air Compressors



American Bristol, 4G



Alfter, 4000-S4

Portability is in the eye of the beholder. Some compressors weighing over 1000 pounds come equipped with handles and lifting brackets. They are classified as portables because they can be moved to remote locations on boats or pickup trucks for commercial operations. For sport diving purposes, however, we will focus on compressors which can be carried by one or two persons.

A compressor can be made quite compact. Several years ago Chuck Lamoreaux, president of American Bristol Company, asked his engineers to design an experimental model which was as light and compact as possible. The result was a compressor that weighed only 24 pounds, including the powerplant. However, the noise and the vibration made it impossible to use effectively.

The smallest compressors available today weigh about 75 pounds. Some even separate easily into two units of about 35 pounds each by allowing the motor to be removed. They can be carried by one person if necessary and are the choice in situations where portability is the prime consideration. The next step is up to the 150 pound range. These units generally have more filling and purification capacity, along with less noise and vibration. It takes two persons to carry them. For this article we will draw the line at 182 pounds, because the larger machines are more expensive and harder to transport. Their added capacity is needed primarily for commercial applications.

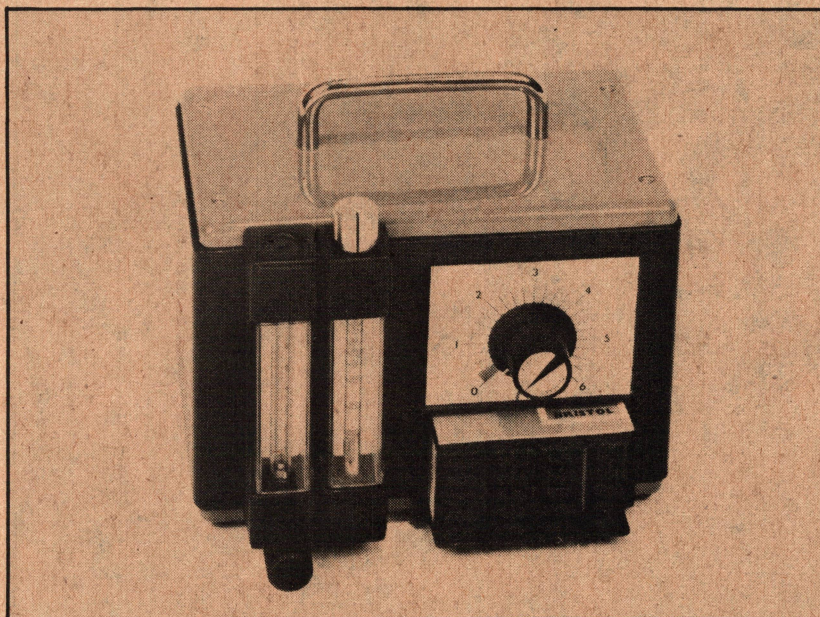
When designing a compressor for portability, some compromises must be made. Just as a Honda lacks the power

and the creature comforts of a Cadillac, the small compressor pumps fewer cubic feet of air per minute, taking longer to fill a tank. The smaller engine runs at higher speeds, adversely affecting engine life. The purification system has less capacity, so chemicals must be changed more frequently. A smaller unit is less efficient — design compromises result in more dead air space in the cylinder.

Portability also restricts the owner's options regarding power plants. The smoothest, most efficient and economical power source is an electric motor. However, since the cactus plants at Cabo Pulmo lack 110 volt outlets, this becomes less than practical. Diesel engines rank next in terms of economy, efficiency of operation, and long life. However, the weight and the cost of the engine alone exceeds that of the compressor and gasoline engine combined.

CHOOSING A PORTABLE COMPRESSOR

Two of the prime considerations in choosing a compressor are how much air does it pump, and how fast. The former is expressed in terms of working pressure. So if you want to fill tanks to 3000 psi you will need a compressor with a 3000 psi capacity, right? Wrong! Running a compressor at its maximum pressure is like running a car at top speed all day. Just as an automobile engine will last longer at 55 mph than at 100, your 3000 psi compressor will last longer if it's asked to pump only 2250 psi. For 3000 psi tanks, a compressor should have at least 4000 psi



American Bristol air testing cube.

capability. The industry is now gearing up for 5000 psi tanks, which are already being used in Europe and are expected to arrive on our shores soon. They will require compressors with a capacity of at least 6000 psi. The key then, according to Chuck Lamoreaux of American Bristol, is to operate your compressor at less than maximum pressure.

The second measure of pumping capability is cubic feet per minute (cfm). The small, one-man portables usually pump two to three and one-half cfm and require over a half hour to fill a 70 cubic foot tank. The 150 pound models pump three to seven cfm, cutting that time in half. When you have to fill six or eight tanks, that can make a difference.

The most efficient compressors do the work at fewer revolutions per minute. The lower the rpm's, the less friction and wear. Although portable compressors generally run at higher rpm's than stationary models, there is a range within the portable field, and less is better.

When compared with larger machines, portable compressors will fill fewer tanks before an overhaul is needed, owing to the higher engine speeds. However, since portable machines are used primarily on trips, they are called upon to fill far fewer tanks over their operational lifetime. Therefore, the period of time between major overhauls can be expected to be about the same.

Efficient cooling contributes to longer life and air purity. The fan and shrouding direct the flow of cooling air. All cylinders and intercoolers should be completely

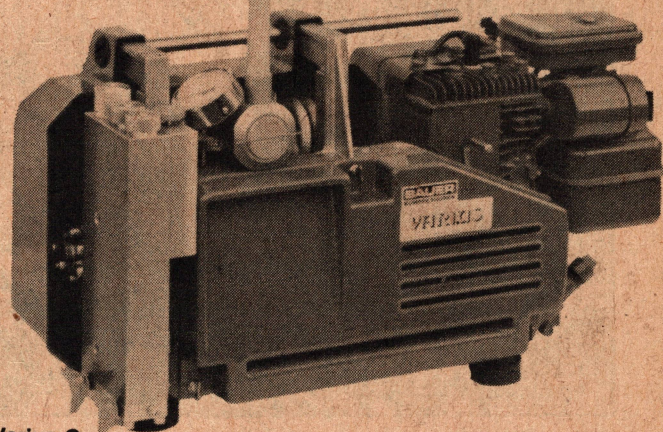
contained within the air flow. If part of the cylinder projects outside the air flow it is not being effectively cooled. A well designed portable will run no hotter than a stationary machine.

Look for a compressor with minimum vibration. Vibration can break cooling fins, rupture high pressure lines, loosen fittings and generally shorten the life of the unit. The only way to check for vibration is to run the machine. It should not have to be tied down while operating. According to master mechanic, Leo Bern, "If it tries to dance across the street, it's got too much vibration."

The purification system determines the quality of the breathing air. Essentially the same chemicals are used by all manufacturers, so the difference lies in the capacity of the system, determined by the size of the filters and the weight of the chemi-

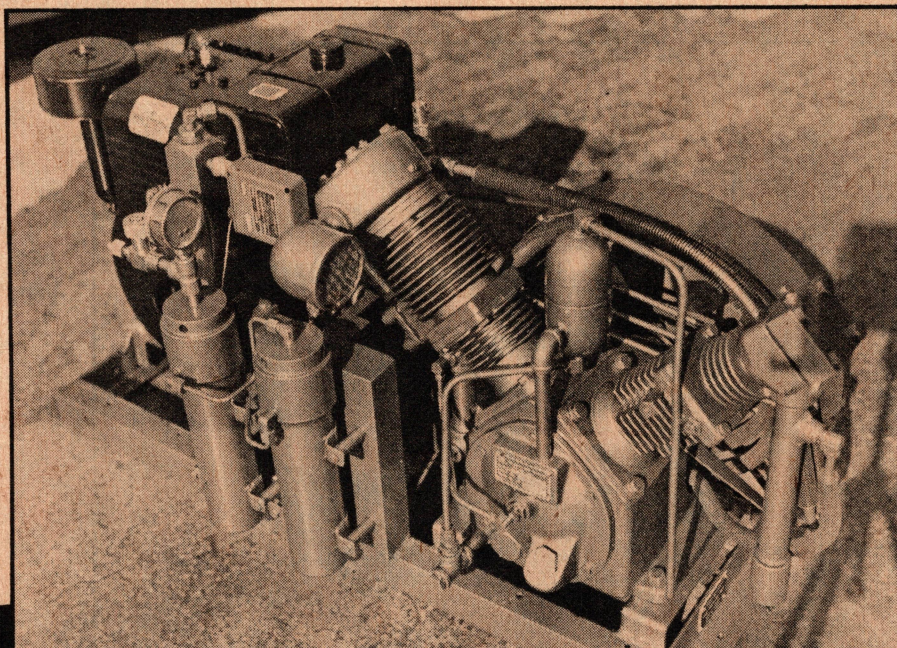
cals contained in them. In this case, bigger is better. Larger systems will purify more tanks of air before the chemicals or cartridges need replacement. Portable compressors will pump air as clean as their larger cousins, the only difference is in the frequency of chemical changes.

Most compressor manufacturers, prodded by state and federal regulations, practice overkill in safety features. The cylinders, hoses and fittings are capable of withstanding four times the rated pressure. This makes the scuba tank the weak link in the system, since it is tested to only two-thirds over working pressure. Interstage safety release valves should be located on each stage of the compressor, calibrated to release air when the pressure exceeds a predetermined point. A final safety should prevent water and oil in the purification system

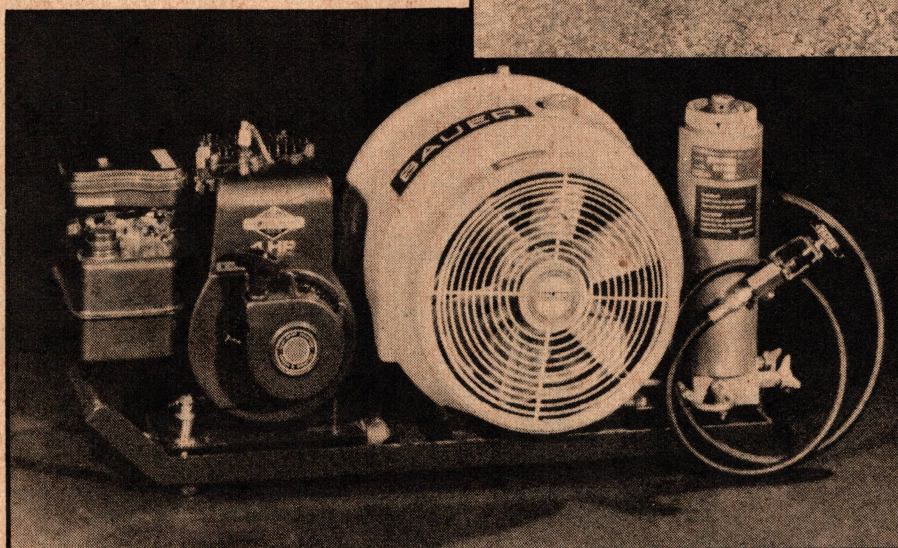


Bauer, Varius G

Portable Air Compressors



Ingersoll-Rand, 223



Bauer, Purus G

from being sucked back into the cylinder. Some manufacturers incorporate burst discs into the safety system. These will relieve pressure, in case a safety release valve becomes stuck.

Look at the overall configuration of the unit. Is it a well balanced design? Poseidon, Mako, and Bauer feature models which separate into two components for carrying — the engine and the compressor. Poseidon's Uni stacks the compressor on top of the motor, while others mount them side-by-side. Shock mounting to the ground will minimize vibration, while an operating platform will keep the machine out of the dirt and sand. Carrying handles should be comfortable and convenient.

Is the compressor easy to work on? How much effort is required to change chemicals? A well designed purification

chamber will open without special tools, and chemicals are replaced in a sealed cartridge. The easier it is to work on, the more likely it is to receive the required care.

Overall quality is a difficult factor to determine. Ask the people who repair them. Leo Bern of Huntington Beach, California, has been installing, repairing, and selling air compressors since 1953. He was the first in his field, and today his firm is the largest of its kind on the West Coast. If you can find someone like Leo in your community, his advice can be invaluable. Leo suggests looking at the company's history. A few fly-by-night outfits appear from time to time, but their products stay on the market only until word of mouth catches up with their shoddy workmanship. A firm which has been in business for a long time has survived by producing

a quality product. A written warranty of at least six months should accompany the machine.

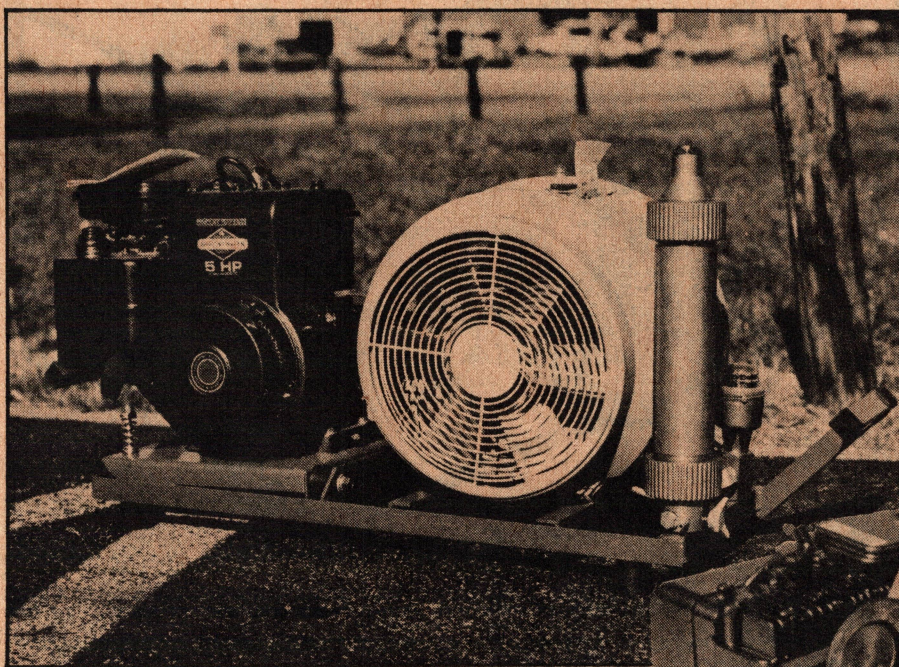
Finally, Leo suggests, "Don't buy a compressor in a box." The dealer should provide a basic education for the purchaser covering operation, service and troubleshooting the machine. "A \$3,000 vacation can be ruined by a \$1.50 compressor part if the user isn't able to fix it," he warns.

POWER PLANT

Electric and diesel power are impractical for most portable compressor applications unless the machine is used on a boat. If the unit is permanently installed on a boat, it is no longer portable. However, the fire hazard can be considerably reduced when electric or diesel power is used, so many owners will make this sacrifice. Others will opt for a more portable configuration to retain the mobility and versatility needed for land based operations.

This narrows the power option to a limited number of gasoline engines. Most portable compressors today use a Briggs and Stratton four cycle motor. It is a hardy, reliable, cost-effective engine which will probably outlast the compressor. Parts and service for the unit are available almost anywhere in the world. Its major drawback is excessive vibration. Most manufacturers offer an upgrade engine for another \$100 or so.

Two cycle engines generally run smoother and are lighter and more durable. However, initial cost is higher, and



Mako, Purus G

lubrication oil must be mixed with the fuel as in an outboard motor. Although the bare engine runs quieter than a four cycle engine, minimal back pressure is essential to its proper operation. Therefore, a smaller, less effective muffler must be used than with its four cycle cousin. The end result is that two cycle engines are noisier.

PURIFICATION

The end product of the compressor is something we all take for granted — clean, pure, breathing air. Yet the term is hard to define, because various standards exist. The Occupational Safety and Health Administration (OSHA) has adopted the Compressed Gas Association's Class D standard as its minimum. California OSHA has adopted more stringent standards, as has the U.S. Navy. Scripps Institution of Oceanography standards, followed by research diving programs all over the world, also differ in some respects. Let's look at air purity specifications to get a better grasp of the function of the air purification system.

Oxygen — All agencies agree on 20.9 percent atmospheric oxygen in the breathing mixture. The permissible range is from a low of 19.5 percent to a high of 23.5 percent by Federal OSHA. The other agencies demand a narrower range. Remember, this standard is for air. Exotic breathing mixtures used for deep saturation diving are not governed by it.

Oil vapor — All agencies agree on a

maximum of five parts per million.

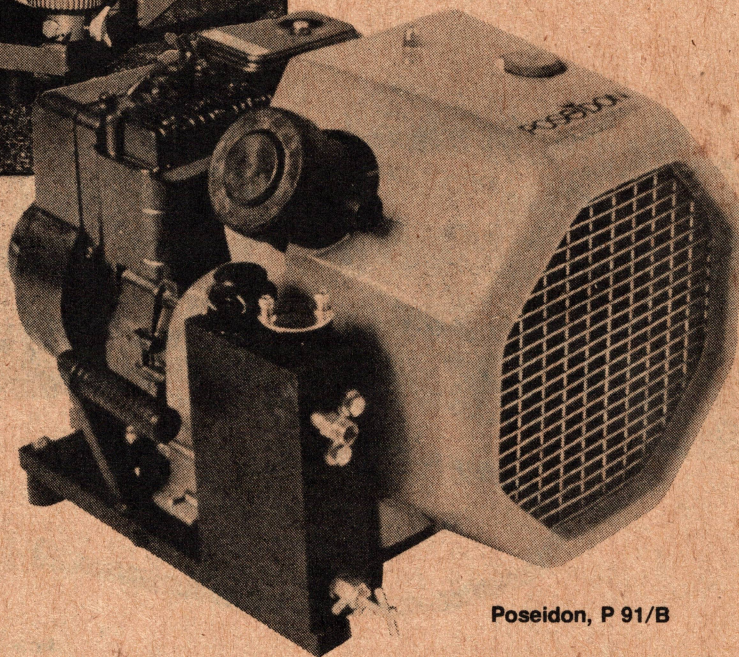
Carbon monoxide — Federal OSHA and U.S. Navy permit up to 20 parts per million, California OSHA permits only ten. Scripps permits 20 on non-decompression dives and ten on dives requiring decompression.

Odor — Any pronounced odor would render the air unsatisfactory.

Carbon dioxide — Federal OSHA allows 1000 parts per million, the Navy 500, Scripps and California OSHA permit up to 300 ppm.

The other agencies stop here, but California's OSHA places a limit of 50 ppm on gaseous hydrocarbons (such as methane) and 0.05 ppm total oxidants (such as sulfur dioxide).

As you can see, defining pure air is akin to the story of the blind men describing an elephant. Everyone has his/her own ver-

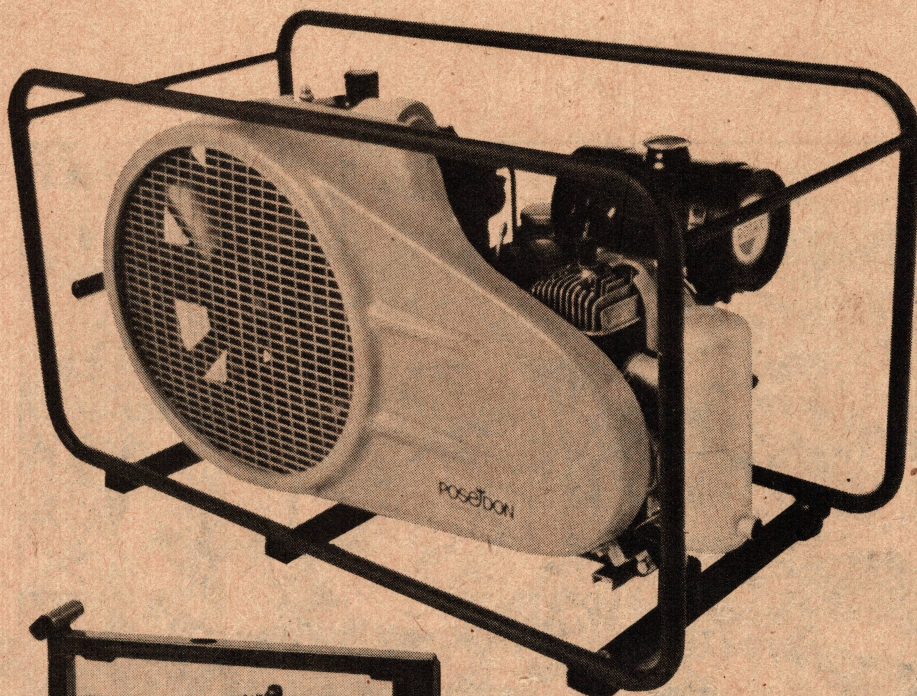


Poseidon, P 91/B

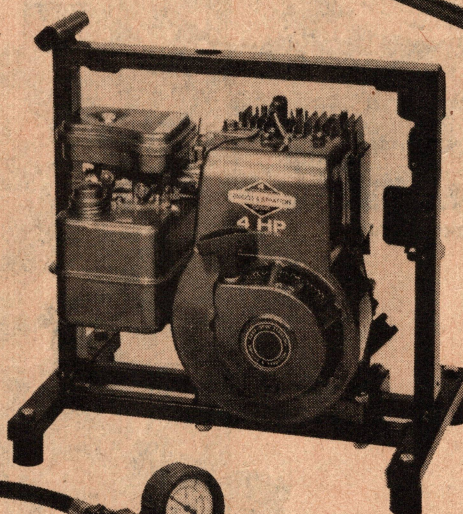
sion. However, any compressor delivering breathing air for diving should be able to meet the most stringent of these standards (California OSHA) when it leaves the factory. Maintaining that performance is the job of the operator, and understanding the purification process will help him/her do it.

The first part of the purification process is the mechanical phase. The air is forced through a series of baffles and is cooled. This causes the moisture and oil droplets to separate from the air and condense on the sides of the purification chamber, then run down into a sump to be blown off later. The efficiency of the mechanical phase is critical to the proper chemical filtration which follows. The chemicals are more effective and last longer when the air is dry and cool. Pressure in the mechanical purification chamber is con-

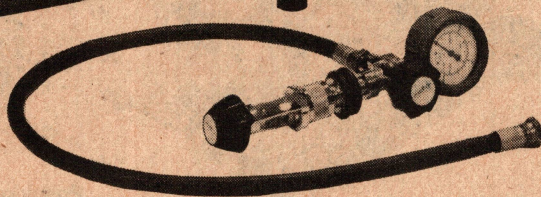
Portable Air Compressors



Poseidon, P 200/R



Poseidon, Uni/B



trolled by a back pressure valve set at about 1700 psi. At high pressures, air molecules are forced together and have less room to carry vaporized oil and water. This also keeps trapped oil and water in the sump, and out of the chemicals downstream.

The air now passes through the first chemical, known as a molecular sieve. Molecular sieves have replaced silica gel and activated alumina as a desiccant. This material further dries the air and removes oil particles by the process of adsorption. Foreign material condenses on the network of cavities in the material which provide a very high surface area. The material itself gains only weight but not size, as would be the case in absorption. Again, the purpose of a desiccant at this point is to provide moisture-free air for the chemicals downstream.

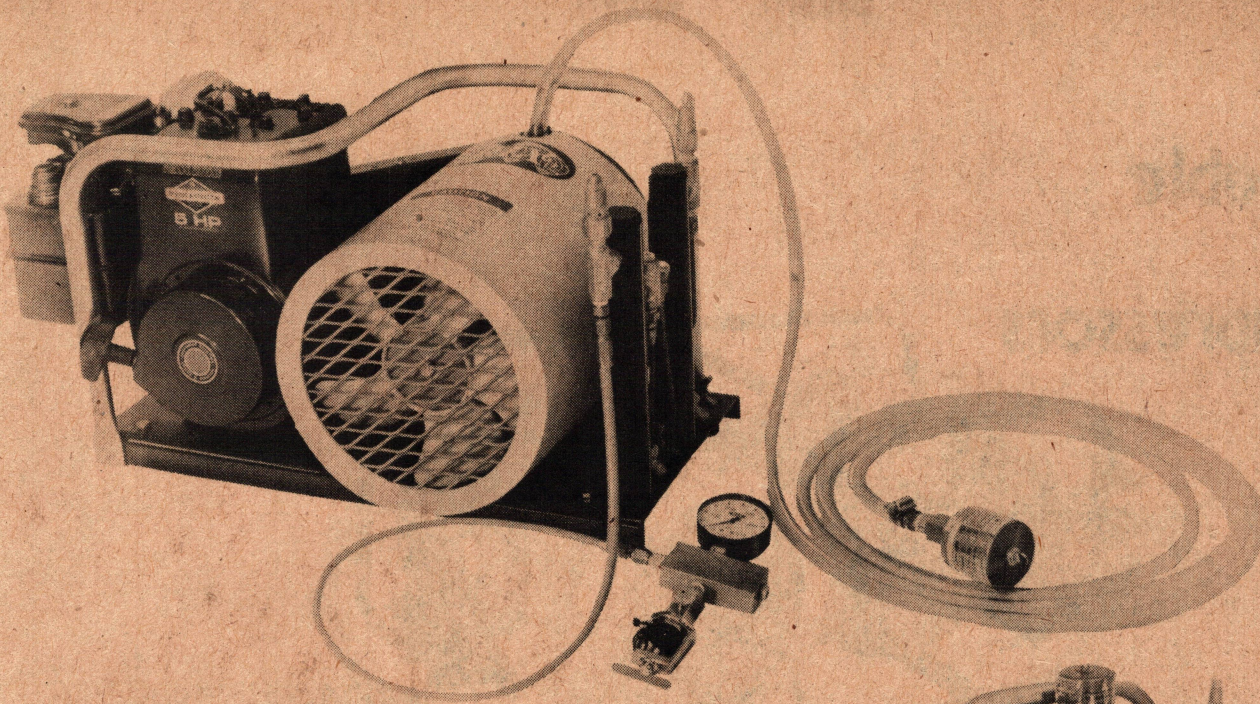
The next chemical, activated carbon, removes noxious odors and any remaining hydrocarbons. Then the air passes through a catalyst, Hopcalite, which changes any carbon monoxide present into carbon dioxide. A catalyst is a substance which causes chemical change without undergoing any change itself. Neither activated carbon nor Hopcalite are effective in the presence of moisture. As a matter of fact, Hopcalite becomes contaminated by moisture and actually removes oxygen from the air. The final step in the process is removal of carbon dioxide, which is done by Soda Sorb.

In a portable compressor, both the mechanical and chemical phases of purification can be carried out in a single chamber. The resulting air is just as clean and pure as that which comes out of a stationary machine with three chambers.

The difference is in the number of tanks which can be purified. The single chamber can process about 50 tanks under optimum conditions, or half that many if the ambient air is hot and humid or contaminated. The limiting factor is the amount of chemicals. Most chemical cartridges have indicator pellets, which change color when the material is no longer able to perform its function.

Changing cartridges is a simple procedure. It merely requires opening the chamber, removing the disposable cartridge, and replacing it with a new one. A typical sealed replacement cartridge contains about \$3 worth of chemicals and costs some \$15. Some manufacturers offer a more economical refillable cartridge. If this is used, be sure the replacement chemicals are stored in a tightly sealed container to avoid contamination. Chuck Lamoreaux tells the story of some divers who stored their opened chemicals in a basement near a water heater. Unfortunately, the pilot light went out and the chemicals performed the task they were designed to do. In this case they absorbed methane gas. When they were subsequently used in the air purification system, the result was some very sick divers.

When comparing purification systems, the total weight of the chemicals determines how many tanks can be filled before changing cartridges. Most manufacturers will install additional purification chambers as an option. The most common is a three chamber setup. In this case, the first chamber is the mechanical



Rix, SA-3G

moisture separator, the second contains the desiccant, and the third has the catalyst and CO₂ absorbent.

LUBRICATION

The biggest controversy in the compressor industry today concerns oil. Specifically, it is centered around the oil free compressor, which utilizes Teflon piston rings that require no lubrication. Its manufacturer claims that only his machine produces no carbon monoxide, therefore pumps the safest breathing air. Others reply that today's synthetic oils enable their compressors to operate without forming the deadly gas. Let's look at both sides of the question.

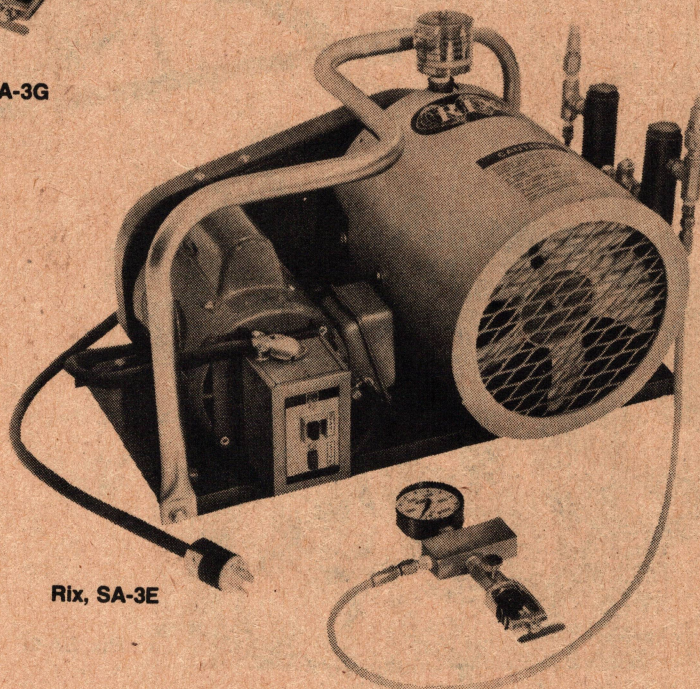
Mike Parker of Rix Industries states that the primary source of all air contamination is the oil lubricated compressor. Oil mist is compressed into the air during the compression process. When oil is heated beyond its flashpoint it bursts into flame, deposits carbon on the pistons, and produces carbon monoxide. Synthetic oils, which are not petroleum based, will not produce hydrocarbons or carbon monoxide, but can cause other toxic gases when heated beyond their flashpoints.

"The primary function of chemical air purification systems," Parker continues, "is to remove the contaminants caused by the oil lubricated compressor." He estimates that 90 percent of the contaminants in breathing air are caused by the compressor itself. Therefore, only an oil free compressor is capable of producing safe breathing air without chemical filtration. The Rix compressor uses only parti-

cle filters and moisture separators in the purification process. Chemical systems are available as an option if a doubt exists as to the purity of intake air.

Breathing air produced without chemical purification has a higher moisture content (high dewpoint). This air is easier to breathe because it does not draw moisture out of the body. Removing the moisture is a necessary step in chemical purification because moisture can destroy the catalyst in the system which changes carbon monoxide into carbon dioxide.

Manufacturers and dealers of oil lubricated compressors dispute Parker's thesis on the primary cause of air contamination, and place the blame on ambient air. Leo and Danny Bern state flatly that there is no carbon monoxide produced if the compressor is operating

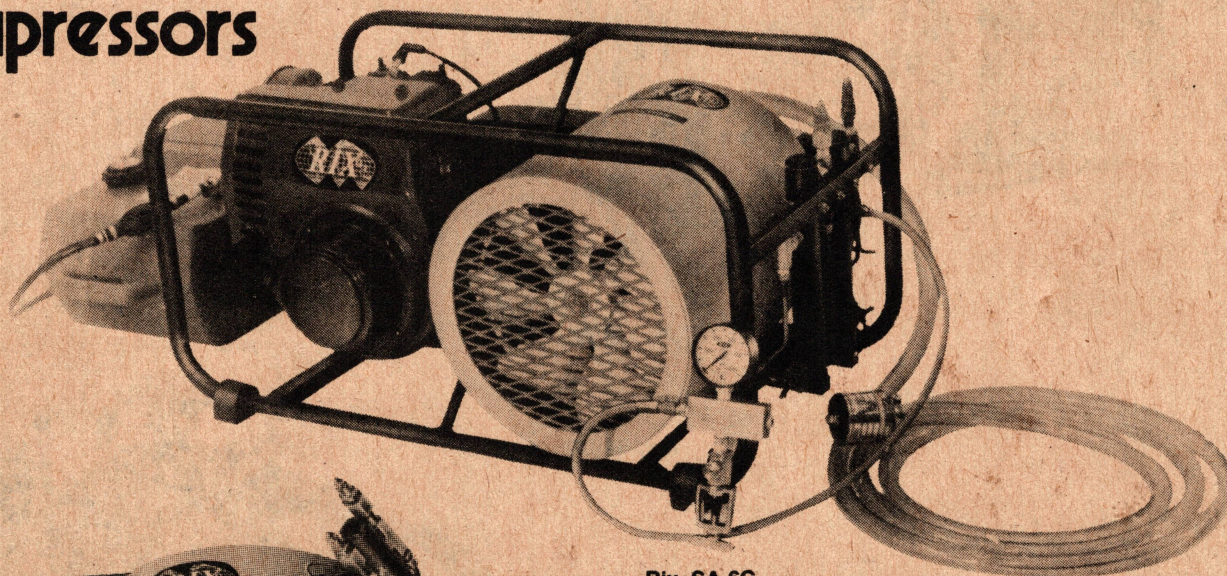


Rix, SA-3E

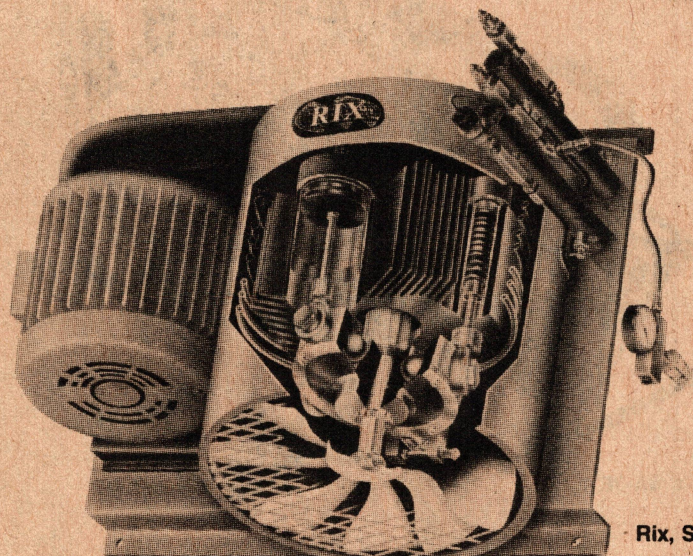
properly and if the right lubricant is used. The right lubricant is a synthetic diester (pronounced dye-es'ter) based oil. It cannot produce carbon monoxide because it contains no hydrocarbons. It has a flashpoint of over 500°F, well above the normal operating range of high pressure compressors (250 to 350°F). Furthermore, tests cited by Tenneco, manufacturers of diester based oils, show their product to be of low toxicity. Finally, it does not deposit carbon on valves and pistons.

There is one caution regarding diester based lubricants. If a compressor has been running on petroleum based or mineral oil and the owner wishes to change over to a diester based product, the machine must be thoroughly cleaned internally to remove all traces of carbon deposits on valves and heads. Follow the

Portable Air Compressors



Rix, SA-6G



Rix, SA-6E

manufacturer's recommendations.

ACCESSORIES

Portable compressors usually come as a complete, integrated unit ready to fill tanks, so the accessory list is small. Furthermore, some optional features like electronic alarms and automatic condensate dump systems are not available on gasoline driven portable units. But a few options are available which can make operation safer or easier.

A high temperature shut-off switch will automatically turn off the compressor if heat exceeds an acceptable level. A low oil level switch will do the same if the amount of oil in the crankcase drops below a preset level. A pressure switch will shut down the machine when a tank is full. This setting can be easily changed by the operator.

Field test kits are available which will indicate the presence of contaminants in the air. The kit consists of a pump which draws a sample and a disposable glass stain tube which changes color if the substance tested for is present. The contaminant usually tested for is carbon monoxide.

Some companies offer a visual in-line monitor. This consists of a high pressure glass window and an indicator material which changes color when the purification chemicals are saturated with contaminants.

Finally, a basic tool and spare parts kit will enable the operator to perform maintenance and basic repairs in the field.

CARE AND MAINTENANCE

Once you get your compressor run-

ning, you will want to keep it operating for several years to amortize the costs. A few common sense procedures will keep it healthy.

Leo Bern suggests keeping a detailed log on compressor operation. This should include a record of all tanks filled, running time, oil changes, chemical changes, and repairs. It's best not to trust these details to memory. Performing maintenance at recommended intervals will ensure both longer, trouble free life for the machine and pure air for the divers using its product.

Keeping it clean is obvious but important. Dust and grease buildup can impair cooling, and salt spray will cause corrosion. Wash the machine with fresh water after it cools. If a water hose is not available, most sand and dust can be removed by high pressure air.

Chuck Lamoreaux warns of moisture precipitation in the cylinders as the compressor cools. When the unit is shut off, the air within it is 100 percent saturated because it is compressed. The condensate caused by cooling can rust cast iron piston rings and cylinder walls. To prevent this, run the compressor for a few minutes with the moisture traps open to blow the water out of the cylinders. If the unit is to be stored for awhile, put a few drops of rust inhibiting oil into the inlet, then run it briefly so the cylinder walls are coated. When restarting it later, just run it for a few minutes with the moisture traps open to blow out the oil.

Compressor oil should be changed twice as often as normal in a humid at-

PORTABLE COMPRESSORS

MANUFACTURER	MODEL	WEIGHT (lbs.)	MAXIMUM PRESSURE (psi)	CFM	POWER SOURCE	RPM	PRICE	NOTES
ALFTER COMPRESSORS 561 S. Lilac Rialto, CA 92376	3500-E	75	4000	4.0	2 hp Electric	2200	\$2300	Walter Kidde compressor modified by Alfter. Electric model is powered by a single phase 115/230 volt motor.
	4000-S4	80	4000	4.0	5 hp B&S*	2800	\$2300	
AMERICAN BRISTOL 1660 W. 240th St. Harbor City, CA 90710	4G	75	4500	2.5	5 hp B&S	2400	\$2458	4E has a single phase 220 volt motor. 7E has a 220 volt motor available in one or three phase.
	4D	180	4500	2.5	4.5 hp Diesel	2400	\$3632	
	4E	87	4500	2.5	2 hp Electric	2400	\$2649	
	7G	175	6000	5.2	8 hp Tecumseh	1200	\$4866	
BAUER BREATHING AIR 1328 Azalea Garden Rd. Norfolk, VA 23502	Varius G	68	4700	2.3	3 hp B&S	2650	\$1695	Varius and Purus electrics have single phase motors. Utilus and Capitano electrics come with single or three phase motors. Varius separates for carrying.
	Varius E	79	4700	2.3	2 hp Electric	2650	\$1695	
	Purus G	81	5000	2.7	4 hp B&S	1650	\$1995	
	Purus E	105	5000	2.7	2 hp Electric	1650	\$1995	
	Utilus G	156	5000	3.6	5 hp B&S	1300	\$3670	
	Utilus E	137	5000	3.6	3 hp Electric	1300	\$3625/ \$3825	
	Capitano G	156	5000	5.0	5 hp B&S	1300	\$4255	
	Capitano E	137	5000	5.0	5 hp Electric	1300	\$4505/ \$4805	
INGERSOLL-RAND McWhorter Engineering P.O. Box 9014 Birmingham, AL 35213	223	175	3200	6.0	9 hp B&S	860	Price on Request	
MAKO P.O. Drawer 1630 Ocala, FL 32670	Purus G	90	5000	3.2	5 hp B&S	2000	\$2095	Uses Bauer Purus block. Electric model uses a 115/230 volt single phase motor.
	Purus E	95	5000	2.5	2 hp Electric	1500	\$2095	
POSEIDON West Coast Distributor L. L. Bern Specialties 17663 Jacquelyne Lane Huntington Beach, CA 92647 East Coast Distributor Victory Auto and Sports 145 Cherry St. Burlington, VT 05401 Florida Distributor Innerspace Research Inc. 4870 E. 11th Ave. Hialeah, FL 33013	Uni/B	79	3200	2.3	4 hp B&S	2350	\$1795	Uni/E has a single phase 115/220 volt motor. P 91/E is available with a single phase 115/220 volt or three phase 230/460 volt motor. P 135/E is available with a single phase 220 volt or a three phase 230/460 volt motor. Rotax engines are two cycle.
	Uni/E	79	5000	2.3	2 hp Electric	2350	\$1795	
	P 91/B	71	5000	3.5	5 hp B&S	1900	\$2546	
	P 91/R	71	5000	3.5	4 hp Rotax	1900	\$2605	
	P 91/E	85	5000	3.5	2 hp Electric	1900	\$2496/ \$2679	
	P 135/B	145	5000	5.0	5 hp B&S	1250	\$4355	
	P 135/R	145	5000	5.0	3 hp Rotax	1250	\$4401	
	P 135/E	154	5000	5.0	3 hp Electric	1250	\$4645/ \$4905	
	P 200/B	148	5000	7.0	8 hp B&S	1300	\$4944	
	P 200/R	148	5000	7.0	7 hp Rotax	1300	\$5001	
RIX INDUSTRIES 6480 Hollis Oakland, CA 94608	SA-3G	106	3300	3.0	5 hp B&S	1725	\$2595	Rix compressors are oil-free. SA-3E standard motor, single phase, 230 volt. SA-6E standard motor, three phase, 230/460 volt. SA-6E and SA-6G are available with a 500 psi max. pressure (at extra cost).
	SA-3E	109	3300	2.2	2 hp Electric	1725	\$2595	
	SA-6G	145	3300	5.5	7.5 hp WR**	1500	\$3995	
	SA-6E	182	3300	5.5	5 hp Electric	1500	\$3995	

*B&S = Briggs and Stratton

**WR = Wisconsin Robinson

Mako and Rix compressors can be rented from SCS Industries, 285 NE 18th St., Miami, FL 33179.

Portable Air Compressors

mosphere. Water can blow by the rings and settle in the crankcase. Dipstick checks will show a false level because the oil is floating on the water below it. The frothy mixture subsequently produced when running the machine does an inadequate job of lubrication. More frequent oil changes will minimize this problem. Oil should always be changed while it is hot because it flows easier and will drain more completely. A final note: When operating the compressor on a beach, be careful while checking the oil to make sure no sand grains enter the crankcase. The machine should be set on a tarp or ground cloth to minimize this possibility.

Cooling is a major consideration, especially if the unit is used in the tropics. Pump your air in the shade, in early morning or in the cool of the evening. The after-dive cocktail hour is a good time to begin, but keep the compressor as far as possible from the main camp to reduce the noise. A couple of hours of compressor operation can make a punk rock group seem quiet by comparison. If non-diving neighbors are camped near your site, be considerate and turn off the compressor at bedtime.

If the compressor must be run in the heat of the day, it can be cooled by building an igloo of chicken wire over it. The structure is then covered with wet towels. The evaporation of moisture off the towels, coupled with the shade provided, will help the unit run considerably cooler.

SAFETY

Safety precautions should be observed to protect both the compressor and the operator. First and foremost, only trained personnel should operate the machine. Be sure the operator is thoroughly familiar with the particular model he/she is running. Next, stay with the compressor while it is running. There are several good reasons for this. A sudden wind shift could cause exhaust fumes to be blown into the intake. In case the automatic shutoff switch malfunctions, the machine can be shut down manually when the pressure gauge indi-

cates the tank is full. Moisture separators should be blown off after each fill, or more often in a humid environment. If an internal valve problem develops, an alert operator can hear the interstage safety valves pop and shut down the compressor before the resulting high temperatures damage it. Life is more pleasant away from the noise, but safety and common sense dictate that the compressor be tended constantly while operating.

The position of the air intake is critical to effective purification. The inlet hose should be at least ten feet long, with the intake protected by a metal screen to keep out bugs and large grains of sand. A micronic paper element filter (similar to the paper elements inside automobile air cleaners) will screen out dust and smaller

RENT A COMPRESSOR

Perhaps you don't travel to remote dive sites often enough to justify buying your own portable compressor. However, once in a lifetime an opportunity may come up and you may need one for a week or so. SCS Industries of Miami, Florida can help. The company rents Mako and Rix compressors. (See the footnote to the specifications chart.) Similar rentals may be available in your area.

TESTING YOUR AIR

American Bristol Company offers a Test Cube air quality test system which is portable, reliable and easy to operate. Detector tubes that test for carbon monoxide, carbon dioxide, water vapor and oil vapor are supplied. The unit measures only seven inches on each side and weighs about eight pounds. The portable model is powered by a rechargeable ni-cad battery with built-in charger circuit. It sells for \$170 (see photo, page 51).

sand grains. Be careful to keep the intake out of the sand or water, regardless of the filters. Tie it to a tree or, if none are available, a pole spear stuck upright in the sand is a good substitute. Most important, be sure the intake is upwind from the compressor, so exhaust fumes are not sucked into the system. Don't patch wet-suits or surfboards near the intake, because chemical fumes can be just as dangerous.

Remember, the tank is the weakest link in the system, so some special precautions should be observed. Tanks should be laid down during filling. Many divers overfill their tanks to compensate for pressure loss from cooling. This is a dangerous practice which could result in blowing of the burst disc or worse. Most

portable compressors pump three cubic feet per minute, resulting in a fill time of about a half hour. The temperature increase during this period is on the order of only 10 to 15 degrees, so the pressure loss is minimal. If you are still concerned, place the tanks in a plastic trash can filled with water to cool them while filling.

Some divers are in a hurry to get their tanks filled, so they override the throttle control to increase engine and compressor rpm's. The unit is designed to run at an optimum speed. Increasing it is dangerous not only to the machine, but also to the breathing air. The air must stay in contact with the chemicals for a given time to ensure optimum purification. If the time is shortened by higher compressor speed, the system is overloaded and the result can be contaminated air.

Another short cut is to fill two tanks at a time. The actual fill time is doubled, of course, but a couple of minutes might be saved in intermediate steps. This is all right if the working pressure of the compressor is at least 1000 psi more than that of the tanks. But if you are filling 3000 psi tanks with a 3200 psi compressor (a practice that is not recommended to begin with) the compressor will last longer if it is given a chance to "breathe" during part of the filling operation. If it is filling two tanks, it will be pumping near the maximum pressure for twice as long, before being able to rest by working at lower pressure for awhile. The high pressure periods are shorter and low pressure breaks more frequent when only one tank is filled at a time.

Be especially careful when refueling a hot compressor motor. Use a spout and a funnel, don't try to slop gasoline into a small opening. A few drops of gasoline on a hot muffler or exhaust pipe constitute an explosive fire hazard. Also, watch the position of the nylon air hoses. They can melt if laid across the muffler or exhaust manifold.

Check for oil or air leaks, because fittings sometimes vibrate loose. At best, it will take longer to fill a tank, at worst the machine can be damaged.

Never remove belt guards from the unit. They were put there to protect your fingers.

If a decompression dive is planned, test the air with an approved test kit before filling tanks. If no test kit is available, or if there is any doubt, replace the chemical cartridge to ensure the purest possible air.

CONCLUSION

You don't have to be an engineer to operate a compressor, any more than you have to be a mechanic to drive a car. But the more you know about your machine, the longer it will supply you with pure breathing air for your dive adventures. ➤

Charles Jehle Sr., president and owner of SeaQuest, was determined to make one point paramount when describing the SeaQuest marketing philosophy. "We're not interested in the low ball end of the dive equipment line," he said. "We intend to be number one in quality and service in this business."

At first I thought this was just another casual use of a tired old slogan. But after spending an afternoon with Jehle, Dell Price, and the SeaQuest people, I decided that he not only meant it, but was proving it every day.

SeaQuest is a specialized equipment manufacturing and distribution company located in Solana Beach, California. Their

absolutely top standards in quality and service. In 1976 after selling and, two years later, buying back the company, Jehle decided to specialize. He decided to limit his manufacturing to his most innovative product — buoyancy compensation devices. It would be enough for SeaQuest to do this one thing and do it better than everyone else.

When Jehle first began manufacturing and selling BC's, the existing designs were of neoprene. The seams in those dive vests were not as strong as today's designs and most vests were capable of holding an internal pressure of only 3psi. But, at that time sport diving was just making the transition from the safety vest (designed to be used only as surface sup-

port or for emergencies) to the true BC which allows divers to compensate for underwater buoyancy changes. Because of the new function of the vest, current designs and materials were no longer adequate.

Working at the time with Harry Rusigno (now president of Seatec) Jehle came up with the double bag concept. An outer bag of tough nylon combined with an inner bag of vinyl produced a buoyancy compensator far stronger than existing designs. Soon this design innovation began sweeping the market. However, problems with the vinyl bag became apparent to Jehle and after a period of research, he came up with a new material for the internal bag —

seaQuest Out To Be First In Quality And Service

Text and Photography
by Howard Hall

business is divided into two operations. First, SeaQuest manufactures buoyancy compensation devices. Second, SeaQuest is the exclusive distributor for Mares products in the United States and Canada. The combination of specialized manufacturing of BC's and distribution of what they feel is one of the finest lines of dive equipment available, has proved to be an extremely successful concept for Jehle, and SeaQuest's growth has reflected this fact.

Charles Jehle began diving more than 25 years ago. He had purchased a dive outfit from the window of a sporting goods store and with it came a brochure explaining its use. Within weeks, he was diving commercially off the coast of New York.

In 1961 Jehle became a salesman for AMF Voit and was soon transferred to the West Coast as product manager. Later, he became merchandising manager of water sports. Jehle worked for AMF for ten years, but in 1971 he decided he wanted his own organization — thus SeaQuest.

For several years SeaQuest manufactured a wide variety of dive equipment. It was the accepted pattern for a manufacturing company to enter the market with as complete a line as possible and then expand it to cover all the necessary gear. This was the way nearly all other manufacturers operated at the time. But one aspect of this method bothered Jehle. When you produce such a broad line of products, it is very difficult to maintain



urethane. Now SeaQuest compensators are made of reinforced nylon outer bags with heat sealed polyurethane inner bags. His current designs allow an internal inflation pressure of 15psi.

SeaQuest offers an extremely broad range of buoyancy compensator designs. There are 13 different configurations with 61 different options. Two important options are offered. One of these is the low pressure inflator system. Many low pressure inflator designs have proved temperamental, but the SeaQuest inflator is as tough as the rest of the compensator, perhaps tougher. It comes with a lifetime guarantee.

The other, and perhaps even more impressive option is the Rapid Exhaust Valve. This inflation/deflation system not only offers easy low pressure inflation of the compensator, but also allows deflation without raising the inflator above one's head. A slight pulling of the inflation hose opens the rapid exhaust valve on the shoulder. Unlike other systems, the rapid exhaust valve allows fast and effortless deflation from nearly any position. This unique design has been on the market for three years and has done much to push SeaQuest to the top in buoyancy compensation sales.

In addition to SeaQuest's specialized manufacturing of buoyancy compensators, the company also acts as the exclusive distributor for Mares in the United States and Canada. Mares is the number one manufacturer of dive equipment in Europe — number three worldwide. But, until two and one-half years ago, the line was all but unknown in the United States. Today, through SeaQuest, Mares is sold in over 800 professional dive stores in

North America.

Despite Mares' rapid rise in popularity in the U.S., SeaQuest remains very careful with the line. Mares products are imported selectively, only the cream of the crop is accepted. Jehle insists upon two prerequisites: First, the quality of the item must be absolutely first rate. Although Mares produces equipment designed to compete with economy lines, SeaQuest refuses to carry them. Second, Jehle insists that SeaQuest be capable of providing first rate service on any gear it sells. If SeaQuest can't back the item up, the company will not sell it. Based on these two prerequisites, SeaQuest currently distributes only one-sixth of the total Mares line.

SeaQuest will soon be moving into the regulator market with the MR12 II regulator. The MR12 II design is being picked up by Mares and will be distributed in North America through SeaQuest. Of course, this brings up the question of service. But, SeaQuest couldn't be in any better shape. Jehle was involved in the design of the original MR12 regulator during his employment at Voit. And now Bill Oliver, designer of the new MR12 II, is on the SeaQuest staff.

SeaQuest has some rather refreshing marketing philosophies that are reflected in the quality of its products. The company doesn't bother to watch its competition very much and is not very responsive to its competition's prices or sales promotions. Instead, SeaQuest carefully observes the market, watching for product demand. Once this is discovered, the item is produced with the highest quality possible, regardless of its cost or potential competition. The product then goes to

the market and must sell or die as it stands. SeaQuest will not cut corners to make the price more attractive. This method of placing quality first has had two favorable results in the past. First, American divers respect quality and SeaQuest's product sales have been excellent. Second, placing quality first makes SeaQuest's second marketing criteria (the ability to provide adequate service on its products) easier. Partly owing to the infrequent return of SeaQuest products, the company seldom even charges for repairs.

Most of SeaQuest's employees are either college graduates or college students. In order to help SeaQuest's student employees to continue their education, Jehle provides them with flexible hours. He feels that product quality is directly related to the quality of the people he has working for him. He feels that any inconvenience to the company caused by employing students with uncertain hours is made up for in their work quality.

SeaQuest also encourages its employees to become divers. Nearly all of SeaQuest's personnel are certified divers, including the secretaries. Jehle feels that employees who are also divers are better able to identify with the problems of customer service and quality control.

Along with his son, Chuck Jehle Jr. (vice president of SeaQuest), Jehle employs 50 people at the Solana Beach facility and an additional 14 sales representatives in nine other locations in the United States. SeaQuest products are distributed and manufactured in Canada by a sister company called SeaWays — of which SeaQuest is a partner.

Right to left, Charles Jehle, Bill Oliver and Dell Price discuss the design of a SeaQuest vest. SeaQuest offers a broad range of BC's.



SDM travel

SECTION

Milne Bay Province in Papua New Guinea is well known for two things: The Trobriand Islands, famous for their lovely island lasses in sexy mini grassskirts; and the Battle of Milne Bay, where American and Australian forces first defeated the Japanese on land in World War II.

We know Milne Bay as our home and as a vast oceanic paradise of nearly 1000 islands set in one-quarter million square kilometers of coral reef-strewn waters. Exploring these reefs was our goal, on an adventure holiday in a country where adventure is a way of life.

We sailed Tropical Diving Adventures' 36 foot dive boat, *Solotai*, from its base in Port Moresby to Alotau, the capital of Milne Bay Province. This diesel-powered, custom built fiberglass boat is fully equipped for up to 20 divers with a 12cfm Bristol compressor connected to an air storage bank and a 5cfm Bauer portable to ensure a constant supply of air.

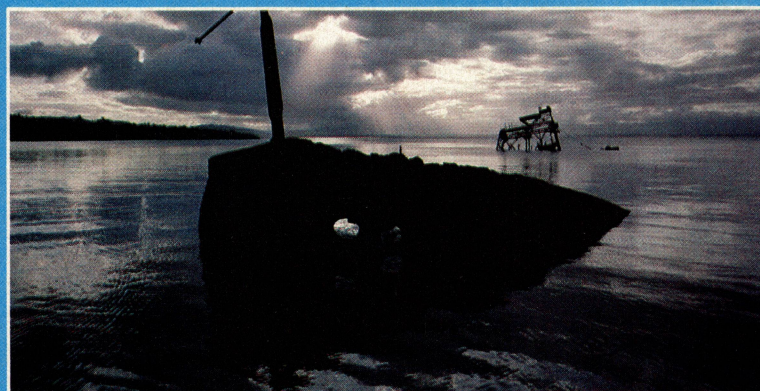
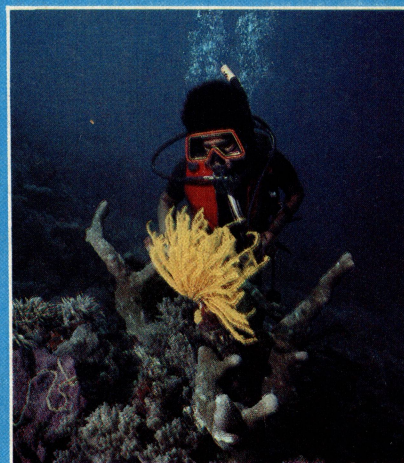
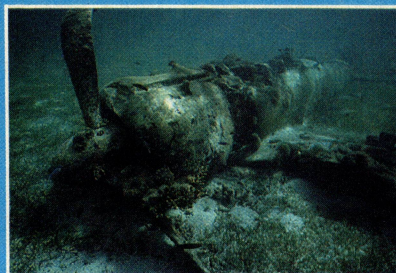
Solotai also has an oxygen, in-water decompression unit, an inflatable chase boat, SSB radio and echo sounder in addition to the usual safety equipment.

On arrival in Alotau, it was only necessary to fill up with fuel and water and top off all the scuba tanks before we were ready for Air Niugini's Fokker F27 Bird of Paradise to arrive from Port Moresby with our 12 adventurers. Within minutes all were aboard and we said goodbye to civilization and set off for East Cape, the eastern extremity of Papua New Guinea.

No luxury hotel or even humble guest house was waiting for us, we were on safari. In the hold were tents and camping gear to enable us to live on the beach if necessary, but we hoped to stay in the villages and add the rich experience of living in another culture to our underwater adventures. We need not have worried, wherever we went we were welcomed openly.

NEW GUINEA UNDERWATER

By Bob and Dinah Halstead



photos/Bob Halstead

Free of the hardships faced by less fortunate villagers in the more rugged and climatically inhospitable parts of Papua New Guinea, Milne Bay residents have abundant natural resources. They also have a generous, friendly nature to complement their attractive features. At East Cape, we set up camp in an old mission house and the locals organized a traditional dance for us.

The next two days were spent exploring the nearby reefs and islands. This was a rewarding time for us. Although the visibility was not as good as usual (around 50 feet) it was fun to

see the excitement generated as the divers saw their first sharks, mantas, turtles and giant clams. In these untouched waters the marine life is prolific and every dive produced new sights, new experiences and rare shells.

After two days we moved on to Nua-kata Island, just two hours away, catching a nice kingfish and a couple tuna while enroute. Here we camped in the village church. The village was full of youngsters and there was much giggling and singing interspersed with gasps and oohs as our various contraptions appeared. Filling air

The Caymans

**"If coral drop-offs
are artistic masterpieces,
the Caymans are the Louvre."**

Paul Tzimoulis, Editor, Skin Diver Magazine

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NEW GUINEA

mattresses with a low pressure inflator proved especially fascinating. In turn, we were treated to a magnificent display by three natives who drummed simultaneously on a tree trunk nearly three feet in diameter. The leader, a highly energetic village girl, would have put any rock star to shame.

The next day, after planting some coconuts on a sandy islet whose reef abounded with giant seafans, black coral and spiny lobsters — some of which ended up in our cooking pot — we sailed down a chain of deserted islands toward Tube Tube, our next camp site. The shark action at these islands is exciting. On our first dive, as soon as we reached the edge of a drop-off at 30 feet, reef sharks appeared from every direction. Not aggressive, and all under six feet long, they were, nonetheless, very curious and would take turns observing us closely. Although we felt perfectly safe, it was quite a buzz just to sit on the reef admiring these beautiful animals.

Tube Tube (pronounced too-bey too-bey) is utterly idyllic. We were greeted by children who paddled out in their outrigger canoes and welcomed us to their beautiful carved and woven houses. There was no corrugated iron or ugly Western junk visible, just things as they have been for hundreds of years — well almost. We discovered one Western intruder apart from ourselves, an anthropologist who was living with the villagers. We were not too surprised, as anthropologists are quite a common species in this remote part of the world!

Diving here was a delight. The reefs were no deeper than 100 feet and covered with beautiful Technicolor seafans, sponges and crinoids. We saw manta rays, kingfish and more sharks, including a very confused wobbegong who swam into the middle of a group of divers before realizing that we were something strange. Relying on his camouflage, he froze immediately and sank to the bottom, but his head caught on a coral branch, arching his body in a ridiculous and very exposed position, much to our amusement. Visibility at Tube Tube was better, up to 80 feet at times, but was still disappointing — we had seen it better.

While based at Tube Tube we made an excursion to Shortland Reef to dive the big drop-off. Turtles were particularly common here. We chased several on top of the reef, after our deep dive. Shortland reef has a large lagoon in its center and with the tide coming in we decided to have a look at one of the channels. When we got there the current was filling the lagoon, so special precautions were required for the dive. We tied lifelines to the anchor chain and our buddy pairs took turns diving to the anchor. We knew this

skindiver

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was to be another action dive. While the first divers were down, snorkelers hanging on the line astern could see sharks, groupers and eagle rays swimming over the reef 40 feet below. A dive to the anchor might not sound like much but the first group returned with eyes wide open, raving about the things that they had seen.

Soon it was time to move again, and sadly we left Tube Tube for the historic island of Samarai. Once, when gold and pearl seeking adventurers flocked to Papua New Guinea, Samarai was its largest population center — even though the island can be walked around in half an hour. Now that the government center has moved to Alotau on the mainland, Samarai, its gardens overgrown and grand tropical houses decaying, has become a sleepy and rather scruffy reminder of the past. But, the magic somehow remains and Samarai, surrounded by the beautiful islands and swirling currents of China Strait, has to be one of the most incredible sights on this earth.

We camped on nearby Pearl Island, guests of Denis and Yulie George, operators of Papua New Guinea's only industry, pearl farming. We were able to admire and purchase exquisite gold, black and silver pearls — right at their source. You can even grow your own pearl by seeding an oyster — the pearl will be sent to you when fully formed and crafted.

In China Strait we were to have some of

our most exciting dives. Through this narrow passage (a mile or so across) the pent up tides, blocked by the mass of the world's second largest island, finally get a chance to pour through. The charts show depths of about 120 feet and currents up to six knots — not a spot for novices!

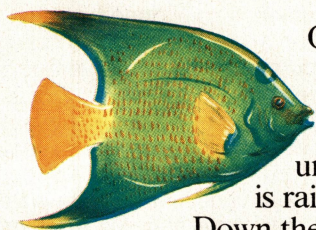
We chose a likely spot in mid-channel, giving a depth of 110 feet on the echo sounder. We lowered a heavy line with a hefty lump of scrap iron tied on it. We felt the iron bump the bottom, hoisted it a few feet and led the first group of seven down to the bottom while the boat drifted on. Each diver attached himself to the main line with a quick-release loop on a shorter length, so he/she could swim clear and fly! And fly we did! The drag caused by the slight difference in speed of the *Solotai* in the surface current and us at the bottom meant we could stretch out our arms and soar and zoom on our individual lines. The bumping and dragging of the weight attracted sharks, and each time the lead diver descended he was greeted by a large, active whaler — but each time the mob of divers appeared the shark vanished. After surfacing, we stayed with the current and were soon through China Strait and heading into Milne Bay. A furious battle had been fought here in 1943 as Japanese invaders tried to gain a stepping stone to Port Moresby. Fighting in the appalling mud and rain of the wet season, Australian and American troops (for the first time)

stopped the Japanese advance. Milne Bay itself is very deep, with only a very narrow coral ledge around its shores. Many of the wartime relics are impossible to dive. (After the tour, Dinah and I sadly watched small oil drops surface and spread from a wartime wreck we had researched and now found, but although we were only 100 yards or so from shore the echo sounder was reading 600 feet!) At other times we had explored small landing barges and even a tractor, dumped down the reef slopes. Now we were heading for the wreck of a large coal refueling barge, sunk in a sheltered anchorage near Waga Waga village, directly across the bay from Alotau.

The wreck has its bow out of the water and its stern in about 80 feet. Near the stern a tall lattice gantry reaches past the surface, a rusty eyesore. Underwater its frames are festooned with clams, gorgonians and black coral. A huge grouper lives on the wreck, but he avoided us this trip. We explored the holds, still partly filled with coal, and admired corals on large winches and cables that were used to transfer coal to the hungry warships. That same night we returned to the wreck, looking for shells, but spent most of the time weaving our way through the towering iron framework of the gantry, which was ablaze with color.

We had been out for 12 nights before the tour was over. This was our inaugural Milne Bay Diving Safari and we were
(Continued on Page 73)

FAMOUS WATER COLORS.



Off the Mexican island of Cozumel, one hundred foot visibilities are not unusual. And the underwater scenery is rainbow colorful.

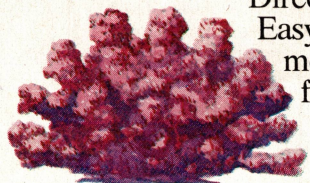
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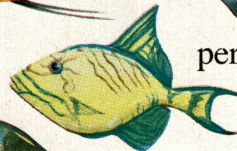
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The Search For A Common Rarity

PEPPERMINT STICK LOBSTER

Text and Photography by Steve Lucas

The thought flashed through my mind, "Jack, you made a big mistake." The reference was to my scuba instructor, Jack Dick, who in 1972 told my basic scuba class that the primary difference between North Atlantic lobster and Caribbean lobster was that the southern variety had no claws. For years I had accepted this as gospel, catching for my dinner table as many of the clawless variety as the law allowed. I have since read numerous references to *Panulirus argus*, the spiny lobster, agreeing with Jack's premise. Yet here in the beam of my dive light, 70 feet below the surface on a Jamaican reef, a small peppermint striped lobster with two very real claws stared at me. Never in my years of diving had I even heard of such a critter; my mind raced for answers. Ignoring the camera in my hand, which could easily document the fact that I was not suffering from some shallow water form of narcosis, I grabbed for the small lobster, hoping to deliver it to the University of the West Indies Marine Research Lab for positive identification. I missed, spending the rest of that dive vainly searching for another.

A month went by and during every night dive I would search for the elusive peppermint stick lobster, a name I had coined. Many of my dive partners thought I had surely blown an O-ring on this one, for they knew that my instructor had been correct and no such lobster with claws existed. A friend at the marine lab agreed to look into some taxonomy books and see if he could find a clue to my quest. No response came back and I assumed that I had seen a species unknown to science. Then it happened. There is an area east

of Runaway Bay on the north coast where the Puerto Rico Trench comes quite close to shore, making a vertical drop from 50 feet to over 2000 feet. We had been diving this area regularly during the day, but had not attempted it at night. One evening we decided to make a night dive on the wall there. As soon as I hit bottom I almost stepped on one, then another, and a third. They were under almost every rock and coral head, and my strobe blazed as I tried to bring back as many pictures as possible of this tiny cousin of the spiny lobster. When I was confident I had some recognizable record on film, I set about capturing as many as I could. I already knew this lobster was nowhere near as large as its cousin, but not until we reached the boat was it so acutely apparent. The largest we had been able to capture was barely five inches in body



length. Some had claws, some did not. One three inch specimen without claws was carrying eggs under her tail, leading us to the assumption, which later proved correct, that only males had claws.

The following morning I made a hasty departure with my live cargo for the marine lab near Discovery Bay. My friend met me with little exuberance, to my great frustration. After all, I was bringing him a specimen unfamiliar to science, or so I thought. He quickly handed me a short article which identified my specimens as *Justitia longimanus*, a rather uncommon lobster which was first described in 1837. The document also informed me that my assumption about sexual difference had been accurate, and that the average size was three to five inches. The lobster is found from Florida through the entire Caribbean, primarily on walls and vertical drop-offs down to depths of 1000 feet — although near Venezuela they have been found in only three feet. My excitement began to ebb, but only temporarily. Science may know about the colorful peppermint stick bug, but none of the divers I told about it had ever heard of it. Even though the lobster has been seen in most parts of the tropical Atlantic, it was normally considered uncommon to rare — at this particular dive site the opposite was true, it was common; very common.

J. longimanus has thrilled numerous Jamaican divers/visitors — they have seen something thought to be nonexistent. The bright red lobster with claws does live in the Caribbean, and on the north coast of Jamaica it is common in at least one area. It astonishes everyone who sees it because everyone knows: "Caribbean lobster don't have claws." 



Opposite, the peppermint stick lobster has claws with movable tips — although these aren't the pincers one expects on a clawed lobster. Above, Janice Lucas examines an average-sized specimen. Left, a five inch male and a four inch female peppermint stick lobster. Only the males of this species have claws.

CUBA'S ISLE OF PINES

After two decades the giant of the Caribbean is ready and waiting for divers

Text and Photography by Rick Frehsee

For more than 20 years the largest of the Caribbean islands and the one closest to the continental United States has been off limits to American divers. Cuba began allowing visits by U.S. citizens in March of 1977 and, it didn't take long for scuba divers to find out that here was a convenient wilderness with new adventures to be found.

Check the vital statistics and you will see why. Location: 90 miles south of Key West, Florida, 48 miles east of Mexico's Yucatan Peninsula. Area: 44,218 square miles, equal to half the land in the remaining West Indies. Cuba, the giant of the Caribbean, is approximately 760 miles long and 55 miles wide. The main island is surrounded by hundreds of smaller cays arranged in four major archipelagos. The total coastline is 5000 miles long and there are 137 beaches.

When Cuba began to consider the possibility of hosting divers, a careful study was undertaken to select the first official dive center. The best choice, for many good reasons, was the southwestern tip of the Isle of Pines, off Cuba's southern coast. Here was the promise of real dive adventure. Hydrographic charts showed splendid coral reefs and vertical drop-offs close to shore. Several wrecks of steel cargo ships were also nearby. Adequate tourist accommodations were on hand and the whole setting was on the lee side of the island. The water was clear, warm and dependable.

A group of dive professionals was assigned the task of performing a more detailed survey to determine specific dive sites. Eighty-one dives were conducted along the wall. Sixteen dive sites of specific interest were found. These featured extensive caverns and swim-throughs which meandered inside the reef to the drop-off, a fine selection of pelagic fish life, and an abundance of black coral within 90 feet of the surface.

El Colony Hotel provided the needed accommodations and creature comforts, and a dive center was built nearby, complete with boats, dockage, compressors and storage. Arrangements were made with stateside air charter services for scheduled flights, and buses were brought in for ground transportation. Although the first reports by divers were positive in terms of the environment, two logistical improvements were necessary. Direct flights from the U.S. to the Isle of Pines without the Havana



Top right, the huge wreck of the freighter, *Rio Jibacoa*.



The twisted wreckage of the *Spartan* group.

Part of the *Spartan* group—a freighter at U/W anchor.

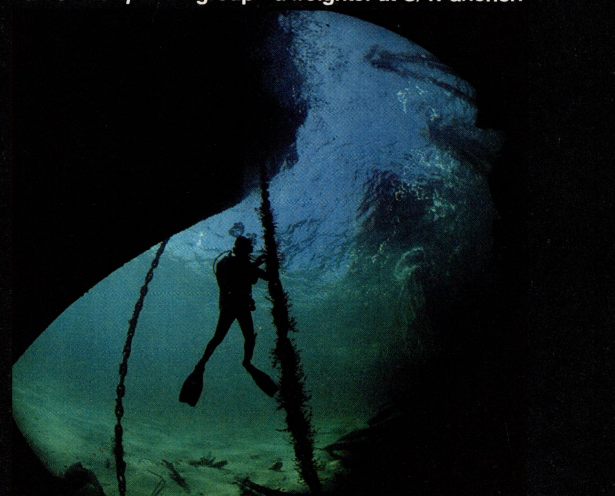


Entrance to El Colony Hotel, Isle of Pines.



One of two large dive boats serving the Isle.

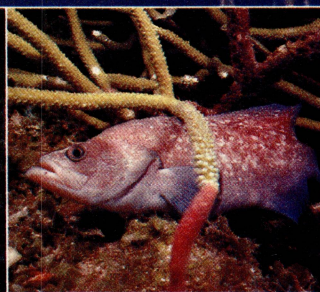
Left, the colorful prop of the gunboat, *Cuba*.





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CUBA

stopover had to be approved, and speedboats were needed to move divers from the resorts to the large dive boats each day. With these problems solved, Cuba was ready to operate on a larger scale . . .

Our American Airway Charters' DC-3 was well kept. DC-3's are slow, but our flight from Miami to the Isle of Pines took a little more than two hours, and we spent most of our time with our faces pressed to the window. Cuba was, after all, a question mark, a mystery that was about to unfold for the first time to the 20 odd divers aboard. The first U.S. visitors were Cuban-Americans visiting relatives or Havana nightclubbers curious about life in the new Cuba. Very little solid information was available on the dive conditions. From the air we spotted the Isle of Pines, or the Isle of Youth as it is now called by the Castro government in honor of the young people who go to school and work the citrus fields there. This island has had 12 different names throughout its colorful history. To author Robert Louis Stevenson, it was *Treasure Island*. Rich in Caribbean history, the island is probably also rich in pirate treasure as well.

The European travel bus met our flight and dropped us at El Colony Hotel ten minutes later. El Colony Hotel evokes a mixture of responses. It's a 90 room L-shaped building. It's not first class, but is air-conditioned, well maintained, the food is very good and there is a variety of things to do, from horseback riding to town excursions. The atmosphere and decor is that of a tropical stucco hotel of the 1950's and the lounge features a unique little evening show with local entertainment and dancing. What makes the whole thing work are the Cuban hosts with their unusual and honest hospitality.

The two 65 foot dive boats are distinctly Cuban fishing boats with plenty of deck space, covered with tarpaulin sun shades. The scuba tanks for the day are stacked along the forward deck. Excellent meals are served on the mother boats and smaller speed boats have been added to shorten the previous one to two hour rides to the dive sites.

The feature attraction of Isle of Pines' diving is the vertical wall. While drop-off diving is a pleasure shared by many locations throughout the Bahamas and the Caribbean, the Isle of Pines version is classic in formation, located only a quarter mile from shore and decorated with a

profusion of fish life from huge groupers to bold pelagics. The top of the drop-off begins in 70 feet of water and the slope varies from 60 degrees to vertical. There are many spots that are literally cliff hangers, with coral spurs projecting off the end of the wall, forming huge spires and vertical drops or undercuts on three sides. Many caverns and tunnels are etched into these formations. The major splashes of color are provided by red, orange, and green finger sponges and huge purple and yellow tube sponges. Several of the large tube sponges are more than six feet long and nearly a foot in diameter. Schools of amberjack, jack crevalle, mackerel, and barracuda patrol the wall and large sea turtles are quite common. Several of the dive sites along the wall feature schools of silvery tarpon that swim down the sand grooves to the edge of the drop-off. One site offers a large flat just above the wall with many southern stingrays half buried in the sand.

The area that the Cubans call mid-reef is actually the spur and groove system that leads to the drop-off. In places there are large sand patches while other areas are dominated by corals. The depths average 45 to 60 feet and the reef fish are abundant. The best night dives are planned in this area. The shallow reefs are quite shallow and, for experienced divers, are more suitable for snorkeling than scuba. These areas are dominated by plate-like fire corals and extensive beds of elkhorn coral rising to sea level.

The shoreline is extremely interesting and picturesque. The two major beaches, while narrow and banded by impenetrable shrubs and underbrush, are a delight for beachcombers. Rugged limestone rock forms coves and small protected snorkeling pools that appear to be designed for a *Blue Lagoon* motion picture. One of the most fascinating formations along the Cape Francis shore is known as LeClerc's Hideout and is a small cave with a sea entrance leading to a hidden beach. LeClerc was a peg-legged, infamous pirate, and while no treasure has been found, watching the sunset from the beach through the small inlet is a special privilege. Fringing the cove are golden encrustations of fire coral and calcareous algae capping the limestone boulders. The sunlit shallows are further complemented with the flitterings of sergeant majors and angelfish. Shelling is excellent at the base of the submerged rocks.

The shallow reefs out from the shoreline are splendid forests of elkhorn and small dome corals with complex passages winding from the inside to the outside of the reef. Rainbow Reef, located a short distance from the drop-off dive sites, was the most impressive of the shal-

low reef formations.

There are three groupings of shipwrecks, and two provide absolutely spectacular visual impact above and below the sea. The wrecks are intentional groundings of coastal freighters and gunboats which served as practice targets for the Cuban Air Force and shore-based artillery during the mid 1960's. Riddled and twisted by bombs and hurricanes, the two major wrecks are still intact and Hollywood could not have created a more impressive undersea studio. The sight of these weatherbeaten and rusting hulls against the turquoise waters of the Caribbean is reminiscent of the World War II shipwrecks of Micronesia. Thirty feet beneath the surface is an unbelievable array of wreckage with huge schools of grunts and snappers cavorting over encrusted decks and twisted railings.

On the wreck of the freighter, *Rio Jibacoa*, and on the gunboat, *Cuba*, it is possible to swim through a maze of passageways and into large cargo holds pierced by shafts of sunlight. Above you hear the splashing of surf and the creaking of wreckage as the sea exerts an unceasing strain on the deserted ships. In the *Spartan* wreck group there is a small coastal freighter which lies upright on the bottom with twin anchor chains hanging from bow to stern. From silhouettes to wide-angles to close-ups, there are hundreds of classic underwater photographs waiting to be taken along the Isle of Pines shipwreck graveyard. The high adventure and visual impact of the Cuban wrecks will, in short time, establish this area as one of the finest dive sites in all of the Caribbean.

The Cuban divemasters are personable and safety conscious. They are most definitely among the finest local divers I have met anywhere in the Caribbean. The Cuban people excel in hospitality and many warm friendships can be developed in a short time. The percentage of those divers who have been to Cuba and plan to return is very high and serves as a testimonial to the success of the Isle of Pines operation.

There is a VIP package available which puts a 73 foot shrimper (converted to a divers' yacht) at the disposal of eight divers maximum for the week. Although this package is more expensive, the advantages make it practically irresistible. Custom dives, superb meals and comfortable surroundings are now available aboard the VIP boat. It is easily one of the most attractive Caribbean dive packages available.

For information and reservations contact Scuba Cuba at American Airways Charters, Inc. (800) 327-7711. In Florida call (305) 557-9281. The giant of the Caribbean is ready and waiting. ➤

The Phoenix Lives !

BY DEREK R. GROUT

Jim Kennard stared intently at the print-out emerging slowly from the side-scan sonar recorder. Three hundred feet behind his small boat and 100 feet below the surface of Lake Champlain, the sonar tow-fish emitted its signals and relayed their echoes to the surface recorder. Suddenly, Jim straightened. "Zar," he said, "Look at this, will you."

Joe Zarzynski left the helm and walked to the recorder which was spitting out a continuous stream of paper. Zar, from Wilton, New York, was hunting for the often-reported Lake Champlain monster and had chartered Jim and his specialized equipment in the search for the elusive creature. "What is it?" he said. The pattern of lines and shadows traced on the chart paper meant nothing to him.

"Joe, it's not the monster. It looks like a wreck. Sorry." Jim scribbled a notation on his map and devoted his attention again to the recorder. The wreck, whatever it was, would have to wait.

A week later Jim called me from his home in Fairport, New York, to ask if I wanted to be on the team to investigate

the wreck. I was elated when he guardedly described the approximate location. It was the *Phoenix*, I told him, with mounting excitement. A three year search had come to an end. Jim, active in locating other lost vessels over the years in the northeast, had come through again.

The story of the ill-fated *Phoenix* begins in the year 1815, with the close of the War of 1812. The war over, Lake Champlain could once again assume its role as the most important commercial highway linking New York and Montreal. With few roads through the dense forests and mountains of New York and Vermont, most travelers and trade goods were carried on the lake in a variety of sailboats and primitive steamboats.

The Lake Champlain Steamboat Company, in need of a new vessel for the anticipated surge in the passenger trade, contracted with Captain Jahaziel Sherman of Vergennes, Vermont, to build a new steamboat. Called the *Phoenix*, she was 146 feet long, had a beam of 27 feet and drew just over nine feet. A side-wheeler of 336 tons, her paddlewheels were 18 feet in diameter. The 45 hp



Bottles found near the *Phoenix*.

photo/Derek Grout

steam engine was built by McQueen of New York and originally had been fitted in the Hudson River steamboat *Perseverance*.

Life aboard the *Phoenix* must have been cramped, to say the least. In his excellent history, *Lake Champlain: Key to Liberty*, Ralph Nading Hill describes her thus: "The main deck of the *Phoenix* . . . was protected by a canvas awning abaft the smokestack. Just behind the 25 foot guards around the paddlewheels were suspended small boats for boarding or debarking passengers, except at main ports. They were entered by way of ladders to the deck. A housing protected a staircase down to the gentlemen's and

(Continued on Page 84)

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SCUBA TOBAGO

Scuba Tobago, the first major dive program to be launched from the United States to this West Indian island, offers an opportunity to explore some of the best virgin reefs in the western hemisphere.

The eight day/seven night program with accommodations at the Crown Reef Hotel (three minutes away from the dive shop) offers a choice of a five dive package priced at \$399 per person, double occupancy, or a 12 dive package, priced at \$474 per person, double occupancy. For the non-diver, each package is \$90 less.



Diving is under the direction of PADI-certified Ray and Jim Young, owner-operators of the Dive Tobago Shop. Tank, backpack, weights, weightbelts, boat and divemaster are included in the package price. The program allows divers taking certification courses to make their open water dives at no extra charge, with a letter from their instructors. Both resort and certification courses are available, as are night dives for divers who bring their own lights.

BWIA, the national airline of Trinidad & Tobago, is the participating carrier for Scuba Tobago, with daily flights from New York direct to Trinidad. The 15 minute connecting flight from Trinidad to Tobago is included in the price of the package.

For further information, contact your travel agent, local scuba shop or Evacar Travel, 25 West 43rd Street, New York, N.Y. 10036; (212) 354-8303.

DIVE HARBOUR ISLAND

Four day/three night and seven day/six night scuba tours to Romora Bay Club on Harbour Island, Bahamas, are available for divers and non-divers through Dec. 15. Prices, per person, double occupancy, for the shorter and longer stays, respectively, are \$240 and \$510 for divers, and \$180 and \$360 for non-divers. Guaranteed departures are August 29, November 7, and December

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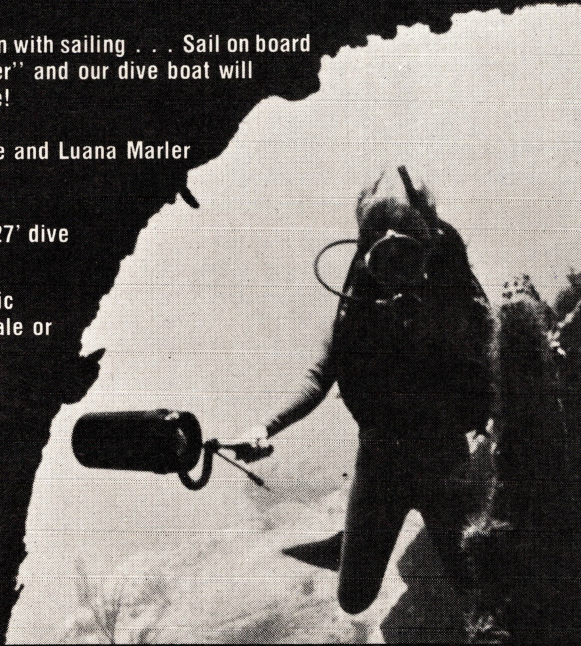
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5. Included in the packages are accommodations, roundtrip airport transfers, breakfast and dinner daily, two boat dives daily on the shorter tour and a total of 12 boat dives on the longer one.

For more information, contact any travel agent, or the tour operator, Weekends Away Travel, Inc., P.O. Box 6698, Hollywood, FL 33021; telephone nationwide toll-free (800) 327-9543, in Dade County (305) 621-7777 and in Broward County (305) 966-2777. 

UNEXSO U/W MEDICINE

The Underwater Explorers Society, Freeport, Grand Bahama, will begin its second decade of underwater medicine programs for physicians and paramedical personnel. The next program is slated for November 21-28. The program is designed for small groups and presents a basic understanding of principles and practices involved with the diagnosis and treatment of underwater casualties.

In addition to the program for physicians, a concurrent program for nursing and other allied medical personnel who are interested in scuba related casualties is being considered for that time period. All those interested should contact Dr. Edward Tucker, director of medical education, 64A North Main Street, Essex, CT 06426; (203) 767-1411. 

UNITED TO MAUI

United Airlines is promoting a new three day/two night Maui No Ka Oi tour with accommodations at Hotel Inter-Continental Maui throughout 1981.

Priced from \$236 to \$273 per person, double occupancy, the package includes two nights' accommodations, sightseeing, departure transfers, all taxes and service charges. Air transportation is additional.

A variety of sporting activities, among them scuba, snorkeling, fishing, sailing and winter whale-watching expeditions, are offered.

For more information, contact any travel agent, United Airlines or the tour operator, Trade Wind Tours of Hawaii, Box 2198, Honolulu, Hawaii 96805. 

NEW GUINEA

(Continued from Page 63)

pleased when our adventurers informed us they couldn't possibly go back yet and were quite content to spend another week or so — if that were all right with us. Why we hadn't even looked for the sunken Zero reported to be just a few miles up the coast, or dived the U.S.S. *President Grant* on the reef south of Samarai!

Next year we will be back, there is a lifetime of diving and more in the unique waters of Milne Bay Province, Papua New Guinea.

For further details contact Bob and Dinah Halstead, Tropical Diving Adventures, Box 1644 Boroko, Papua New Guinea. 



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Harbour Island Bahamas

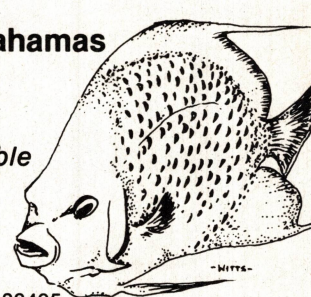
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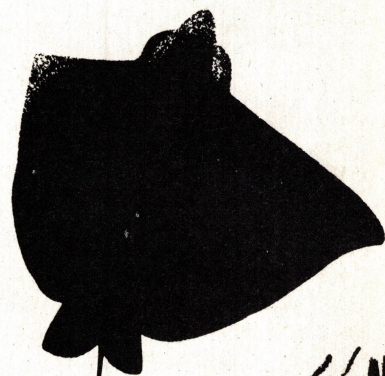
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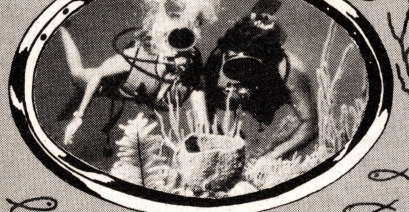


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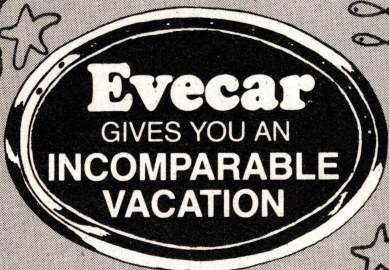
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PHOTO BONAIRE

Dive Bonaire has opened a special division for underwater photographers: Photo Bonaire. Now, divers who wish to record Bonaire's underwater magic on film have several new options: daily E-6 (Ektachrome slide) processing, underwater photography equipment rentals and underwater photography instruction.

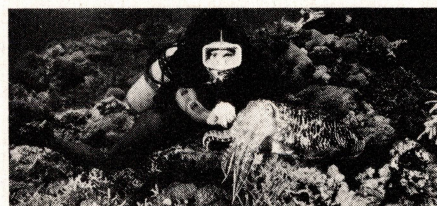
Photo Bonaire sponsors two types of underwater photography instruction: one and three day courses, offered weekly, and six day special courses. The weekly courses are taught by Photo Bonaire's instructor and manager, Dee Scarr. They include classroom work as well as instructional dives for a maximum of five students, and because of their small size have enough flexibility to meet individual student needs.

Four times yearly Dive Bonaire and Photo Bonaire sponsor the Rick Frehsee School of Underwater Photography. Frehsee has created a comprehensive six day package just for Bonaire divers. Students dive from a flattop boat reserved exclusively for the course. Each day's slides are viewed and critiqued the next morning. The Frehsee course is unique in that instruction is given in the use of both the Nikonos IV-A and housed 35mm camera systems.

For more information write, via airmail, to Photo Bonaire, c/o Flamingo Beach Hotel, Bonaire, N.A.; or call toll free (800) 847-7198.

ROESSLER TO PHILIPPINES

See & Sea Travel of San Francisco is offering a full schedule of departures to the Philippines during the spring of 1982.



Utilizing the 102 foot *Seaquest*, See & Sea's clients have the opportunity to photograph marine life — amid the splendor of intricate coral gardens teeming with brilliant tropical fish.

The best weather for legendary Apo Reef is during March, April and May. Carl Roessler will escort the April trip.

For further information contact See & Sea, 680 Beach Street, Suite 340, San Francisco, California 94109; telephone (415) 771-0077.

BVI'S TROPIC BIRD

Oceanquest, which specializes exclusively in dive travel for individuals and groups, has been appointed the booking agent for the 98 foot Motor Yacht, *Tropic*

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Bird. Based in Tortola's Roadtown, the *Tropic Bird* can accommodate up to 24 divers and offers diving in the British Virgin Islands.

On the *Tropic Bird*, divers and non-divers live in a comfortable air-conditioned vessel with lounges, bar, dining area, good sized staterooms and lots of deck space for sunning. According to Frank Shane, Oceanquest's president, "Each trip is tailored to the particular group on board."

Oceanquest is now arranging eight day dive packages for groups and individuals. The Saturday to Saturday package is \$585 per person, plus roundtrip excursion airfare from your city of departure to Tortola. Special charters can also be arranged. Early booking is suggested, and can be made by calling Oceanquest toll free at (800) 526-1394 or in New Jersey (201) 744-5254. For more information, contact Oceanquest Tours, Inc., 139 Woodlawn Avenue, Upper Montclair, New Jersey 07043. 🐠

BRUNO TO SEA SAFARIS

Nicky Bruno has recently been appointed office manager at Sea Safaris.

Certified at Dive 'N Surf in Redondo Beach, CA, Nicky has been a travel professional for four years and is well-versed in South Pacific destinations such as Fiji, Rarotonga and Tahiti.



To contact Nicky about these and other dive destinations, write or call Sea Safaris at: 3770 Highland Avenue, Suite 102, Manhattan Beach, CA 90266; (213) 546-2464. 🐠

CAYMAN BRAC MEDICAL SEMINARS

The next course on the Medicine of Sport Scuba Diving will be held October 17-24, on Cayman Brac.

This course has been approved by the AMA for 25 Category I credits, by the American College of Emergency Physicians for 25 Category I ACEP credits and by the American Academy of Family Physicians for 25 Prescribed Hours.

In addition to the academic course, a complete dive program has been arranged and will include diving off the islands of Cayman Brac and Little Cayman. For brochure and information, please contact Medical Seminars, Inc., 11406 Whisper Moss, San Antonio, Texas 78230; phone (512) 492-5656. 🐠

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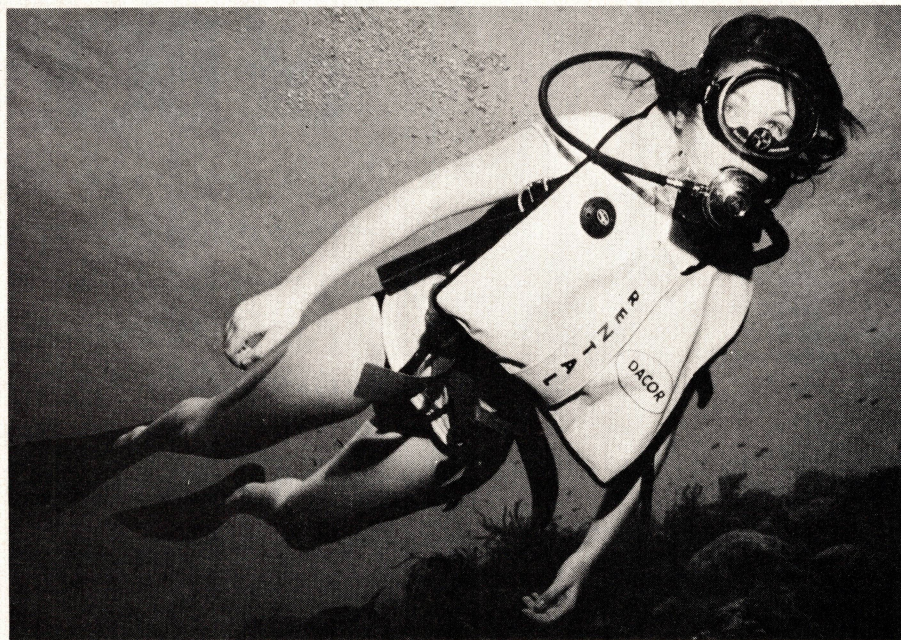
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Bonaire Diary

BY JOHN BATEMAN



photo/Dee Scarr

When a young girl uses her allowance to subscribe to a national dive magazine and then embarks on a subtle lobbying campaign to visit friends on the island of Bonaire, certain conclusions are obvious.

MID-FRIDAY ARRIVAL BONAIRE

Daughters can be delightful, but persuasive. Mine is both. She talked me into a wonderful weekend in Bonaire, the Caribbean Island known to be a diver's delight.

Our ALM flight brings us in midday Friday, and I'm at once struck by the atmosphere. There's a tranquility here one can almost touch!

Well, almost, because Lisa's in a hurry to visit old friends, Alice and Peter Hughes of Dive Bonaire. So we're off to their dive shop. They're conveniently located in the Flamingo Beach Hotel and in no time at all we've easily fallen into step again, as if we'd only just parted the previous day.

Having divined my daughter's growing interest in scuba diving, they quickly introduce us to a new friend, Dee Scarr, a nationally certified scuba instructor. Dee's a former English teacher who's traded her conventional four-walled classroom for the lovely limitless one submerged beneath Bonaire's crystalline waters. We're told she does extraordinary things with cameras and she's currently conducting personalized photo instruction with a special program to initiate nautical novices to the wonders of the deep.

Lisa and Dee spend the afternoon

snorkeling. They're getting to know each other and Dee's helping Lisa feel more comfortable in the water so she's prepped for her first dive tomorrow morning.

FRIDAY EVENING

Lisa is quiet, but I surmise her thoughts are on the impending dive.

We attend Dee's entertaining and informative program, Touch the Sea, which she uses to initiate the beginning diver to the underwater environment. She's successfully brought all her teaching expertise to this slide presentation which is dynamic enough to make even this old land rover start thinking about taking the scuba plunge. The presentation explains how man is an intruder in the undersea environment and how marine creatures respond to his presence. The shots are breathtaking and not only pique Lisa's eagerness, but help her better understand the underwater environment she will encounter the next day.

We turn in early because the scheduled first dive is at 0900. Sharp.

SATURDAY MORNING

Lisa's moment of truth. Her mouth is taut. She's said little all morning. Now every bit of her energy is spent concentrating on last-minute instructions from Dee. And then they're gone: Lisa waves over the boat's wake and the tension that had been building around her since our arrival moves swiftly out to sea.

And I, land lover that I am, am immediately overcome by Bonaire's strange palpable tranquility. I decide to laze away the morning, reading, relaxing, succumbing to Bonaire's seductive sun-

shine and gentle lapping waters.

I do not worry about Lisa. I fully understand her subdued state since our arrival. At 13, she's challenged herself with an entirely new experience. She was sure to have butterflies in her stomach and I was certain she'd been working hard to keep them flying in formation. After all, I reasoned, she's a strong swimmer and a very determined girl.

NOON

Tranquility abruptly ended, reverie shattered as Lisa explodes into the room. Beds become trampolines. Her exuberance and glow pervade the atmosphere as she shrieks and one long, gasping, laughing, bubbling, "It was fantastic!!!" comes tumbling out of her. "Absolutely fantastic! Unbelievable..." She trails off breathless. Speechless. Laughing delightedly. (Apparently an "Oh, wow" just wasn't good enough this time.) Maybe the Bard of Stratford has words to describe the feverish excitement and magical wonder expressed in those dancing eyes of youth. But I don't.

There follows a tumultuous description of the colors, the giddiness of the initial backward splash into the blue, the fish, the coral and above all the wondrous feel, the freedom, of the sport itself. Words come rushing out. She admits she'd been concerned she'd somehow make a fool of herself. Now there's no doubt. We've got a diver in the family!

AFTERNOON/EVENING AND ON INTO SUNDAY

We now live, eat, breathe and sleep diving. There are long discussions on dive techniques. There are unpronounceable names, biological terms, connected with diving. There are serious decisions about the selection of dive sites. But most important, there's an unmistakable drive to dive.

I am grateful that the dive boats whisk her away for two and one-half hour stretches — afternoon, morning, and afternoon again. And pina colodas help relieve the exuberant assault to my senses.

MONDAY

Time has been our most deceptive companion. Monday has come ahead of schedule and I view Bonaire — the diver's delight — from our ALM DC9 window. Despite almost 20 years' casual familiarity, it's as if I'd seen this tranquil treasure for the very first time — through Lisa's dancing eyes.

BACK IN MIAMI

The lobbying resumes. "Hey, Dad, know what I want for my birthday? Huh, Dad? Huh?" tugging at my sleeve as we gather up our bags. Again the excitement lights up her face; again the wonder of her underwater odyssey dazzles in those large blue eyes. "Bonaire!" "Of course," I laugh: This non-diver understands. >

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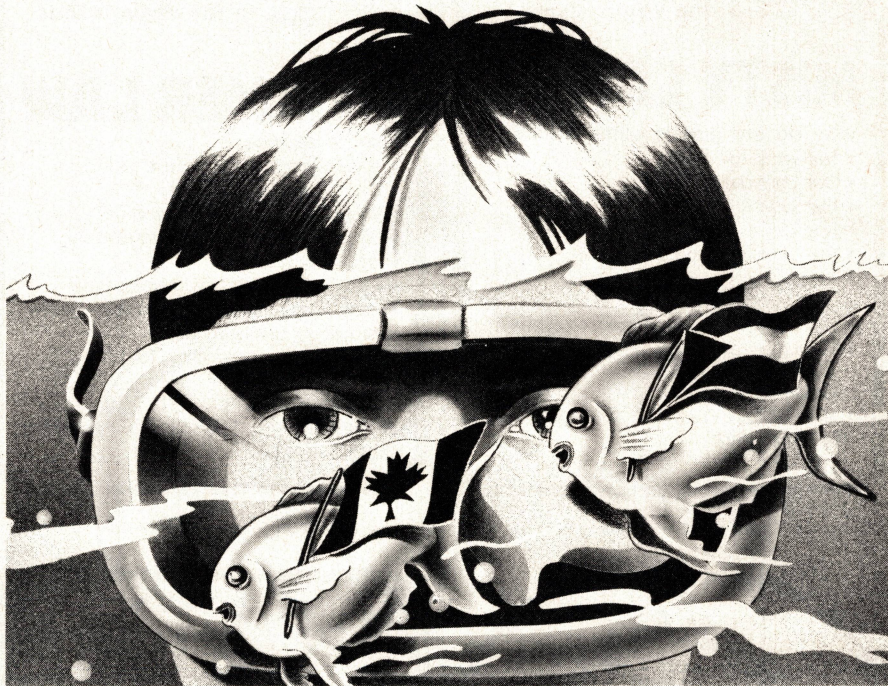
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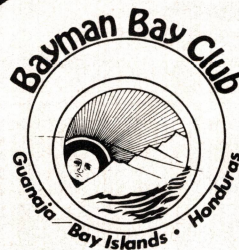
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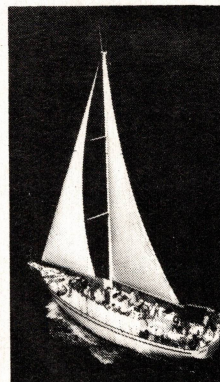
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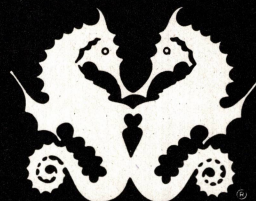
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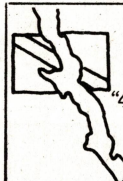


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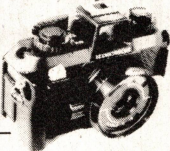
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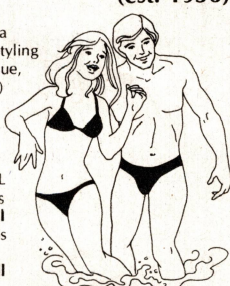
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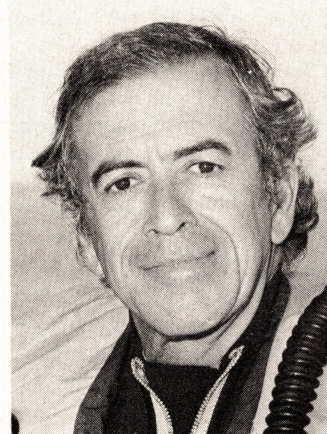
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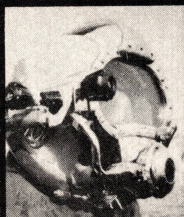
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THE PHOENIX LIVES

(Continued from Page 70)

ladies' cabins, decorated with the most stylish furniture. A small stateroom, smoking and baggage rooms, a barber-shop, kitchen and pantry, captain's stateroom and separate office, and an area stacked with cord wood, competed for space with the boiler and engine. The *Phoenix* had no pilot house or any passenger facilities on deck other than a railing to keep them from falling off."

The *Phoenix* was assigned to the run from Whitehall, New York, at the southern end of the lake, to St. John's, Quebec, on the Richelieu River. The total distance was about 150 miles. The initial fare for the complete trip was \$8.00, including all meals and accommodations. This was quite a considerable sum in 1815, but over the years it would eventually be reduced to \$4.00 as a result of increasing competition for passenger traffic by rival steamboat companies and the fast-expanding railroads.

Teamed with the smaller steamer *Champlain*, the two ships left the opposite ends of the route each Tuesday and Saturday at 2:00pm, stopping at many points along the way to take on passengers and cargo and, most importantly, cords of wood for the insatiable engine. Although it was perhaps a slow trip due to the delays at each landing, the steamboat voyage on Lake Champlain must have been a memorable one for the passengers: They were carried through some of the finest scenery in New England. Benjamin Silliman, a professor at Yale College, made the trip in September 1819. Later he wrote, "During our passage . . . we had a fine descending sun shining in full strength upon the bold scenery of the lake and that I might enjoy it undisturbed by the bustle of the crowded deck, I took my seat . . . where I was protected equally from the fumes of the boat and the chill of the air and could, at my leisure, catch every variety of images and all the changes of scenery that were passing before me."

The hard work took a heavy toll on the new boat and in the winter of 1816-17 the *Phoenix* was drydocked and thoroughly reconditioned and overhauled. A new engine was installed, raising the speed of the *Phoenix* to eight miles per hour, and the reliable McQueen engine was put into the *Champlain*.

She saw her share of important people during her working life. In July, 1817, President James Monroe traveled briefly on the *Phoenix* while on a tour of northern New York state. A year later, draped in heavy black crepe and her flag at half-mast, the *Phoenix* carried the exhumed remains of General Richard Montgomery to Whitehall, en route to New York City for reburial. Montgomery, a hero of the Rev-

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olutionary War, had been killed on Dec. 31, 1775, while leading an attack on Quebec City and had been interred there.

The end, when it came, was quick.

On Saturday, September 4, 1819, the *Phoenix* departed Burlington, Vermont in the early evening with some 46 passengers and crew. It was slow going as she headed into the teeth of a stiff northwest wind, bound for Plattsburgh, 20 miles away on the New York side of the lake. At about 2:00am on the Sunday morning, when off Colchester Point, a fire started in the galley and the alarm was quickly sounded by John Howard, one of the passengers. Apparently, members of the crew had just finished a midnight snack and had left a candle burning between the shelves of the pantry.

The sturdy vessel was quickly headed toward the nearest land as the fire spread to the oil around the engine. The fire broke through the deck and enveloped the whole midships section, as high winds fanned the flames into an inferno.

Two boats were launched into the rough seas, the captain standing at the gangway with a loaded pistol in each hand to prevent panic and a headlong rush for the boats. When the boats had returned after landing the first set of passengers on Providence Island a second trip was made and more passengers and crew were taken off. However, 11 people were still left on the flaming deck including the youthful skipper, 21 year old Richard Sherman, acting-captain in place of his sick father. Hill describes the captain's bravery: "Upon the departure of the second lifeboat he strapped some of the remaining passengers to planks and threw chairs and benches over for others to cling to. When all the others had left the *Phoenix* the captain took to the water on a table-leaf. He was discovered unconscious near Stave Island over two hours later and was picked up by one of the lifeboats which had landed its passengers on Providence Island and then returned for those floating near the wreck." In spite of the heroic efforts of Captain Sherman and his crew, six persons died, including the ship's stewardess.

The *Phoenix* burned to the waterline and was visible that night for many miles, lighting up the sky with a bright red glow. The burning hulk drifted with the wind, finally grounding on Colchester Shoal. In the next few days the engine was salvaged from the hulk. It was installed in the *Phoenix II* in 1820. Other loose items of value that could be removed were taken off as well.

Over the years, the brooding hulk of the *Phoenix* lay quietly on the rocky bottom of Lake Champlain, moved slowly each year down the sloping wall of Colchester Shoal into deeper water by the ice.

Today the remains of the *Phoenix* may be easily explored by the sport diver. The

(Continued on Page 92)

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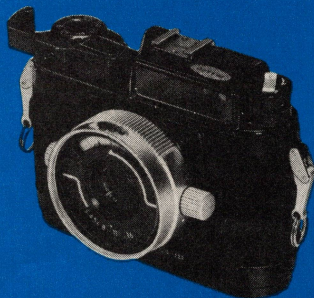
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MYSTERY STONES OF PALOS VERDES

Text and Photography by Michael T. Dickerson

The scene in the parking lot outside the small dive shop could only be described as a strange one. A group of men, some wielding television cameras, huddled around a collection of oddly-shaped rocks which appeared to have had holes drilled through their centers.

These, it seems, were no ordinary rocks — nor was this a run-of-the-mill camera crew. It was a production team from a television program which purports to explain the unexplained. Why all the fuss over a bunch of rocks?

It all began five years ago when Bob Meistrell, co-owner of Dive 'N Surf in Redondo Beach, California, stumbled across the rocks while scuba diving off the nearby Palos Verdes Peninsula. His friend Wayne Baldwin, then assisting in a kelp transplant program, soon found another of the mysterious stones. Suspecting that the rocks might have some archaeological value, the divers set out to raise a few and try to determine their origin.

What surfaced was nothing less than an argument over who really discovered and explored the Pacific Coast — and America, for that matter — that might have made the blood of Sir Francis Drake boil, to say nothing of Columbus and Leif Ericson. What was once only a quiet scientific discussion became an international controversy with China claiming leadership of the I-Discovered-America Club.

The Chinese case was presented late last year in an issue of China Reconstructs, an official English-language magazine published by the Chinese government to improve its image abroad.

The article, authored by Chinese maritime historian Fang Zhongpu, asserts that an obscure Afghan born Buddhist monk named Huishen was the first true explorer of the New World. Huishen, according to a history volume of the ancient Liang Dynasty, set sail in the year 452 and returned to China 47 years later with a spellbinding tale of a land he called Fusang.

Huishen said Fusang lay "20,000 li" to the east — about 7000 miles. The monk's astonishing voyage took place 500 years before Leif Ericson set sail for North America, and 1000 years before Columbus sailed off to plunder what he presumed would be Asia.

Fang cites the Palos Verdes rocks as partial evidence of an early Chinese visit, and he uses the testimony of American

scientists to back up his claim.

Not long after the rocks were discovered and a few of them were raised, they were identified as very old Chinese anchors by James Moriarity and Larry Pierson, underwater archaeologists at the University of California at San Diego. The site of the discovery, where about 30 of the mystery rocks remain, "is a large shipwreck of Asiatic origin, probably going back several hundred years," Moriarity concluded.

"An estimate of the age of the Palos Verdes rocks can be arrived at only by comparative methods," Moriarity wrote in an archaeology journal. "The location is in a shallow area of bedrock, well scoured. There are two wooden shipwrecks in the immediate vicinity which lie at approximately the same depth. Two other large, steel-hulled ships were driven ashore close by. The relative physical condition of the wooden wrecks (the oldest is some 100 years) indicates a much greater antiquity for the anchor wreck, since nothing remains of a ship, other than these stone artifacts."

Other scholars are not so sure. Frank Frost, an underwater archaeologist at the University of California at Santa Barbara, claims the Palos Verdes site is neither ancient nor a shipwreck, for he believes the rocks are made out of Monterey shale.

"About the only people who could have made them locally were the 19th century Chinese fishermen who worked out of San Francisco and San Diego," Frost asserts. "I don't think it's a shipwreck. My hypothesis is that the heavier stones were permanent moorings, some of the others anchors, and the rest related to their fishing nets, or methods in some way."

Frost, who heads an ongoing study of the site, said he has found no other artifacts which might indicate the presence of a shipwreck, but an underwater sweep of the site is planned for this purpose. He described the site as "about half the size of a football field," in very shallow water off the area of the peninsula known as Bluff Cove, north of the famous wreck of the *Dominator*.

"It's not known for certain that the Chinese fished the reef at this site," Frost admits, "but we do know that they fished all the way from Vancouver to Cabo San Lucas. And this reef was, and still is, a very rich fishing area."

Frost said Moriarity's conclusions contained some "inconsistencies," and he added that there was "absolutely no way

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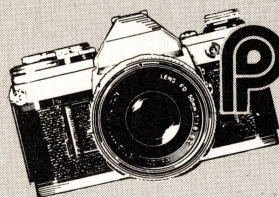
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1. The PADI Underwater Photography Search Competition is open to all amateur photographers. Only underwater photographs will be accepted.
2. All entries must be submitted to a participating facility for local judging. Local winning entries will then be sent to PADI Headquarters for international judging. Applicants may enter as many photographs as they wish; photographs may have been taken any time with no geographic restrictions.
3. An entrance form and a \$4.00 fee per entry to the participating Training Facility shall accompany all photographs submitted. The completed form acknowledges reprint rights for PADI International when proper photographic credit is given. The utmost care and handling will be given all entries, but no responsibility will be assumed by PADI International or any PADI Training Facility. Photographers retain ownership, and all entries will be returned after the judging has been completed.
4. Winners shall be chosen in one category, color slides. Participant's name, address, telephone number, facility name, and the title of the photo must be printed clearly on the back of each entry.
5. Local judging will be done by PADI Training Facility staff members, international judging will be done by the PADI Underwater Photography Search Competition Committee.
6. Winners will be chosen by a point system based on technique, lighting, and composition. Decisions by the judges shall be final.
7. The Search Competition shall begin August 1, 1981 and end September 30, 1981. National winners will be announced in Spring, 1982.

MYSTERY STONES

of dating these rocks."

Nonetheless, Frost remains puzzled by the nature of three other stone objects located a quarter of a mile out from the site in 65 feet of water. One he described as "an enormous spheroid rock, about one and a half tons, that was obviously shaped by humans." The other two, he said, are short, cylindrical rocks with holes drilled from the top halfway through.

"I have no idea what these things are," Frost said. "But for now I have to assume they're somehow related to the fishing industry."

The divers who discovered the rocks are even more baffled: "I'm absolutely mystified as to the origin of these things now," Wayne Baldwin declares. Both Baldwin and Meistrell are assisting in the logistics of the ongoing research through the loan of their own boats and equipment to the research divers.

Curiously, Moriarity now concurs that the Palos Verdes rocks might have come from turn of the century fishermen, but he maintains that the site is a large shipwreck of Chinese origin. While research on the site remains inconclusive, Fang and Moriarity still cling to their belief that Chinese vessels reached the New World in Pre-Columbian times.

Their prime evidence is yet another mystery rock which was inadvertently dredged up in 1975 about 140 miles west of Santa Monica, California. The doughnut-shaped, 80 pound rock had "clearly been made by tools," said Roland Von Huene, the U.S. Geological Survey marine geologist who first spotted it.

The Patton Escarpment Rock, as it has become known, was shipped to the U.S.G.S. station at Woods Hole, Massachusetts. Scientists there found the stone covered with a layer of manganese of a thickness that led them to conclude it had been on the ocean floor a very long time — perhaps as much as 3000 years.

Parts of the rock were sent to a University of Taiwan geologist who reported that the stone was a fine-grained dolomite or recrystallized dolostone of a type which exists in large quantities on China's Liaotung and Shantung peninsulas. Moriarity and Pierson, meanwhile, assert that such stone has never been found in California.

The rock, Moriarity concluded, was a so-called messenger stone which could be sent sliding down an anchor line to strip away accumulations of seaweed.

As to whether ancient Chinese ships were capable of transpacific voyages, Fang and other scholars have no doubt. "China led the ancient world in navigation," Fang writes. "As early as the 4th century B.C., her ships plied the neigh-

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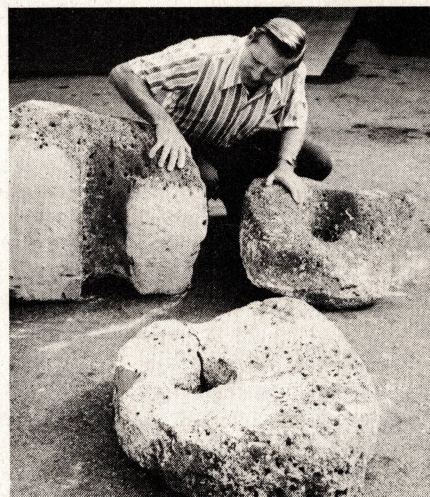
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MYSTERY STONES

boring seas . . . and entered the Pacific beyond . . .

Fang adds that one 3rd century Chinese kingdom had a navy of some 5000 ships. The largest of these had several decks with enough berths for 3000 passengers. "Voyages to the Philippines and other South China Sea ports were then commonplace," he claims.

"Chinese sailors were able to calculate sailing speeds and the length of voyages . . . So it would have been quite possible for Chinese ships to cross the Pacific in the 5th century," Fang writes.



**Wayne Baldwin examines the mystery stones.
Were these left by ancient Chinese explorers?**

Others theorize that the Japanese current, also referred to as the California current, may have assisted in such a voyage. They point to the appearance of a Japanese junk off Santa Barbara in 1815. On board were 14 dead and three survivors. The ship had sailed from Osaka for Tokyo, but had been blown off course by a storm. Crippled, with no way to maneuver, it had been carried all the way to California by the current.

Moriarty tells of a letter from a colleague that describes bits of Japanese pottery that turned up in an archaeological dig in Redondo Beach. The fragments had been carbon 14 dated at approximately 3000 B.C. Other reports tell of prehistoric bowls found near White-water, New Mexico, that closely resemble Chinese pottery. A similar discovery was made in Ecuador in 1965.

As early as 2200 B.C., Chinese historical volumes tell of a strange and exotic land to the distant east. The works describe strange animals and peoples, vast deserts, towering mountains and trees that climb thousands of feet into the sky. The works also describe a "great luminous canyon" with brilliant, multi-colored walls and a "bottomless ravine"



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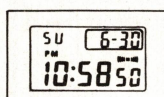
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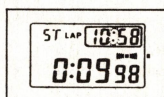
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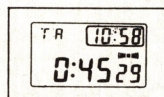
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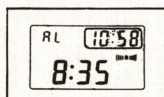
Normal time display: hrs./mins./secs., AM/PM, day, month, date, and 12/24 hr. time



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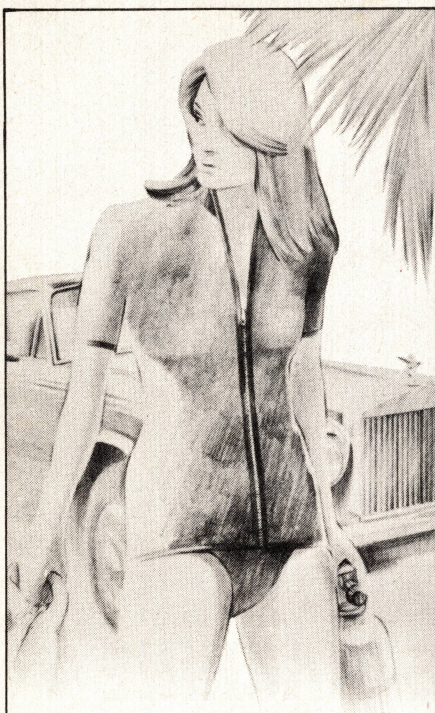
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MYSTERY STONES

through which a small river flows. Many believe this is the Grand Canyon.

As for the fabled land of Fusang, Fang believes Huishen has described, with astonishing clarity, 5th century Mexico. "Huishen's detailed descriptions of social life, including marriage customs, crime and slavery, tally almost exactly with what we now know of Mexico at that time," Fang asserts.

Huishen also told of the sacred Fusang Tree, which the people ate parts of, built their homes from, used as paper and named their country after. Fang claims this is the cactus-like agave, common throughout Mexico.

An intensified search for further relics along California's coast, Fang said, "may well turn up more evidence of friendly intercourse between China and the early Americas in ancient times."

But for now, the origin of the Palos Verdes mystery stones remains as uncertain as the currents at the site of their discovery. Is the location an ancient shipwreck, or is it simply the wreck of an old fishing junk? Is it a wreck at all? Could the presence of so many stones in one place be explained merely by the unknown methods employed by turn of the century fishermen? And what is the significance of the three rocks which lie apart from the rest, farther out in deeper water?

Whatever else the experts may disagree upon, they all seem to agree that these questions are likely to remain unanswered until extensive additional research is undertaken. Until then, the Palos Verdes mystery stones remain, like the lonely rock sentinels of Easter Island, mute guardians of venerable secrets. >>>

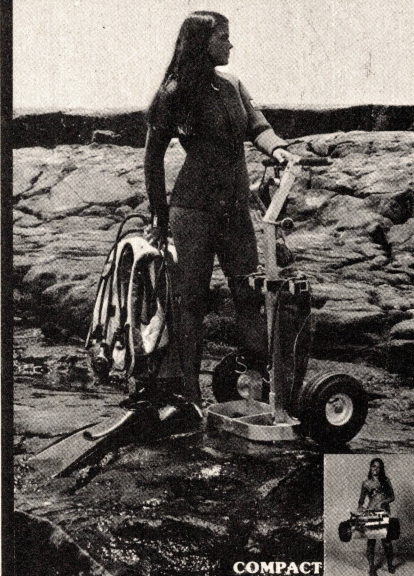
THE PHOENIX LIVES

(Continued from Page 85)

bow section lies in about 60 feet of water and bears the telltale signs of the devastating fire; charred timbers end abruptly just above the former waterline. The wreck lies upright on an incline and at 95 feet the empty steering gear sockets greet the diver. The bottom is hard rock with only a light dusting of fine silt and visibility at depth is excellent. On my first dive, I switched off my dive light at 70 feet and could easily see both sides of the hulk as I sat on the keel. Sunlight filtering down through the green water illuminated the ghostly scene. Schools of perch swept past, more imagined than seen. Large black bass, mouths agape, watched with curiosity as my buddy and I explored the remains. Eels swam nervously away as we approached their lairs in the timbers.

The sides of the *Phoenix*, lacking internal support, have collapsed outward but

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the diver with imagination and a picture of the ship in his mind's eye can easily reconstruct her. The timbers are very well preserved and are still solid to the touch thanks to the long period of immersion in cold, fresh water and the absence of wood-boring worms. Here and there in the hull one finds lumps of metal or glass, twisted and fused in the conflagration. Shards of plates and other small objects can still be found in the hull; the many bricks lying about were probably used as ballast or as a lining for the galley stoves.

A survey chart of the lake is useful in locating the *Phoenix*. Colchester Shoal is about ten miles north of Burlington on the east side of the lake and almost directly across from Port Kent, N.Y. The shoal is marked by two black buoys; about 200 feet north of buoy BC 15 is another buoy, submerged at a depth of four feet. On a calm day this can be found easily by peering into the water from a boat; in rougher conditions, a skin diver can find the buoy by swimming for a few minutes in the right area. Alternatively, if your party has two boats at its disposal, tie a weighted line between the two boats and cruise back and forth to snag the buoy. This submerged buoy is chained to the mid-section of the *Phoenix*, 70 feet below.

When diving on the wreck, in view of the relatively great depth, some divers may elect to make their second (or perhaps third) dive of the day around Colchester Reef, one-quarter of a mile away. The square gray foundation of the former 19th century lighthouse is a very prominent landmark and this area provides good pickings for the bottle collector. The lighthouse itself can be seen at the Shelburne Museum, a few miles south of Burlington.

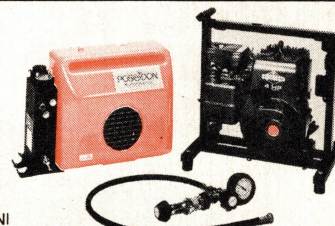
Lake Champlain is the largest deep, freshwater lake in the United States (after the Great Lakes) and divers planning to dive the *Phoenix* should be experienced in small boat operations. Storms can come up suddenly and waves of two or three feet are not uncommon, particularly when the wind is from the south. The large lake does not react to local weather; rather, it creates the weather.

Air stations are conveniently nearby in Burlington, where the staff of both Victory Auto Sales and Northern Divers are always pleased to welcome visiting divers and to direct them to all the great diving areas in Lake Champlain. On the other side of the lake the Sub-Aqua Dive Shop in Plattsburgh can provide visitors with full service. The nearest boat ramps to the wreck of the *Phoenix* are in Mallett's Bay and Port Kent.

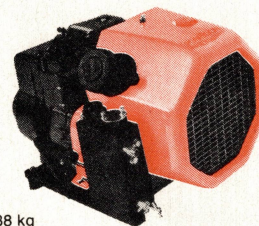
There is a certain magic and excitement about diving the wreck of the *Phoenix*. Like her namesake in ancient Egyptian mythology, the *Phoenix* was consumed by fire, but unlike the mythical bird, she did not rise from the ashes to begin a new life. Today, only her spirit lives on. ➤

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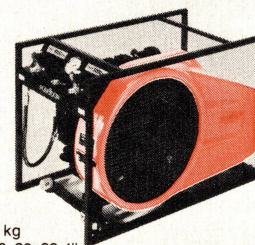
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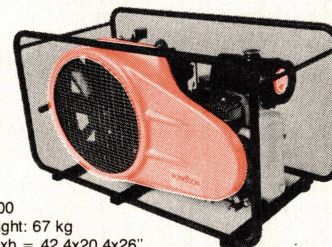
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PHOTO CONTEST

(Continued from Page 11)

siderations include such basic areas as photographic quality, composition, technique, and story.

(1) Photographic quality — The most important initial judgment will concern the technical quality of the photograph. Proper focus, exposure, contrast and color balance should be considered musts for any photograph submitted for competition. Pictures which are blurred, too dark, or otherwise lacking technically will seldom make the first cut in the judging procedures.

(2) Composition — Composition will likely be the second most important consideration for grading a photograph. The placement of various components of any photographic image will largely control the aesthetic appeal of the picture; whether the shot appears balanced or awkward, exciting or static, attention-grabbing or stale.

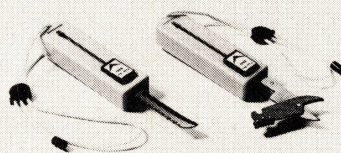
(3) Technique — Points may often be earned in competition for techniques relating to masterful use of equipment to achieve a photograph's desired effect. The creative use of lighting, filters, film, and camera-handling techniques can be of great importance in producing outstanding photographs.

These first three considerations are aspects of photography that must be learned by any diver looking to improve the quality of his or her underwater photography. They can be learned, of course, through trial and error, reading and observation, but most people find it more advantageous (and certainly less time consuming) to take an underwater photography course. These are widely available at dive stores and resorts throughout the world.

(4) Story — Photographic quality, composition, technique and the action of the subject matter all combine to bring the story home, hopefully producing a powerful message in the photograph. An effective story is photography's most difficult quality to achieve. Although on some occasions, photographs that dramatically move and delight the viewers may just happen, any professional will tell you that — consistently producing moving, meaningful photographs requires planning and hard work.

A valuable, award-winning photograph will often have been the result of a complex series of steps, including pre-design on paper, planning, choreographing and discussing the model's movements in detail before the dives, choosing equipment and film to best meet the photographic design and water conditions, and finally shooting frame after frame in the attempt to record that perfect moment.

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As a general rule, carefully review the literature provided for any competition you may wish to enter. If judging details are not automatically provided, request them. Your chances of success may be greatly enhanced by entering photographs which you have prejudged using the contest sponsors' published parameters.

Although certain competitions may specify a particular theme, such as fish life or divers, most are open in terms of the subject matter. Very often, however, category divisions will be outlined and they are worthy of attention. For example, many contests offer at least a salt water and fresh water distinction; the inland photographer with the opportunity to expand his freshwater shooting skills may find it more beneficial to concentrate on the freshwater categories. The number of entries usually will be many fewer than in the highly contested saltwater categories, where entries may be present from clear-water, tropical diving areas.

The broad issue of photographic subject matter is worthy of detailed examination. The chief considerations will concern whether to shoot with a close-up or a wide-angle approach.

CLOSE-UP SUBJECTS

Generally, the majority of photographs received in photographic competitions are close-ups. This condition occurs chiefly because extension-tube photography is the easiest means to produce good pictures.

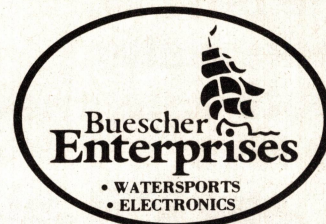
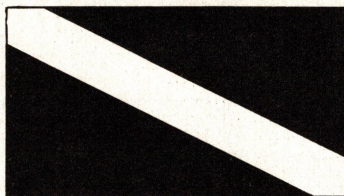
Even a beginner, by combining a creative eye and this formula-photography (in respect to camera to subject distance, focus, exposure, and lighting technique) can take exciting, high-quality photographs (and win).

This is both an advantage and disadvantage to the novice photographer. While the chances for capturing an excellent photograph are increased, the number of similar entries in any competition is also very high. For contest judges, the most difficult choices to make in deciding between entries often involve numerous close-up photographs.

For the beginner wishing to work in the close-up category, certain judging parameters take on increased importance. Since most of the pictures submitted will have good focus, correct exposure, adequate contrast, color balance, etc., the points earned in the aspects of composition, technique and story will often determine the winner. A dramatic poignancy or sense of comedy (story), an artful or otherwise creative placement of the subject matter (composition), or a skillful use of lighting (technique), are the qualities which build contest winning photographs, especially among the close-up entries.

WIDE-ANGLE

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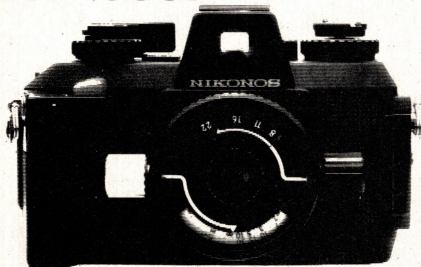
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PHOTO CONTEST

the highest judging appeal and the highest eventual commercial value, especially when the photo features divers in action. In terms of subject matter, the most accessible undersea creature (the diver) may indeed be the least featured subject in underwater photo contests.

Besides offering a high winner potential, wide-angle, diver involved photography also demands photographic skills. Increased expertise in terms of lighting balance, focus and composition (as well as the need for working with models), all combine to stimulate the aspiring photographer to expand both his knowledge and the level of his photographic goals. Additionally, the underwater photographer/model relationship may provide grounds for the perfect buddy team. Many experienced photographers, in fact, seldom shoot without their regular model/buddies present!

Once the technical aspects are mastered, the addition of a model to a photograph also adds tremendously in terms of composition and story. Model placement can be carefully controlled to highlight certain subject matter and provide a sense of proportion. The relationship between the model and sea creatures can express a vast range of emotion, sensitivity and drama.

As to commercial potential, most dive oriented magazine and book publishers will tell you in no uncertain terms: the most sought after photographs for publication are divers in action. This fact certainly adds to the value and appeal of wide-angle photography.

FORMAT

Most competitions, besides giving some choice in location — subject matter categories, will also separate judging into format divisions. The most common are color print, color slide, and black and white print.

COLOR PRINT

Probably the least workable category for most contest participants is color print. Acceptable competition-quality prints are expensive and the potential for damage is high. This may be balanced somewhat by a relatively low number of entries in the category. For those who can produce their own custom color prints (rather than pay a lab), this may be an attractive area.

COLOR SLIDE

The color slide group is the dominant division in any photographic competition. Because of the excellent quality, low expense, ease of duplication, and low potential for damage, most photographers (and contest organizers) favor

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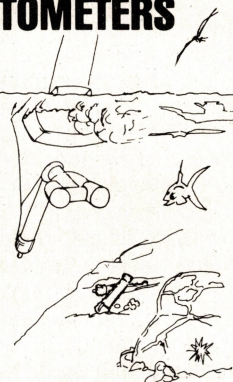
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the color slide medium. The obvious drawback, of course, is the high degree of competition within the category.

BLACK AND WHITE PRINTS

The black and white print division is a real sleeper in underwater photography contests. Despite the fact that custom black and white prints can be produced so easily and inexpensively, there is a notable absence of black and white work in most competitions.

Besides the very small number of entries, there are other advantages, especially for the novice. With very little expense, the use of a home darkroom can result in not only greatly enhanced creative potential but also can provide photography's most insightful learning opportunity. In the darkroom, the photographer most directly realizes the complex interplay between light, camera, film and art that comprises photography in its truest sense.

PREPARING FOR COMPETITION

The last consideration in entering competition concerns physically getting the photograph to the contest organizers. The first step is a thorough review of the contest literature. This will provide the specific information on fees, packaging requirements, deadlines, etc., as well as other already mentioned important considerations such as categories, judging parameters, technical restrictions, and so on.

PHOTO COMPETITIONS

So, now the time has come to find a contest. Watch for announcements of these in the local and national dive media, as well as dive stores and clubs in your area.

Remember, when entering U/W photo competitions, you can be successful — when you shoot to win! 🐟

NAUI SAFETY SEMINAR

The Pacific Northwest branch of NAUI will sponsor the 1981 Diving Safety Seminar at Highline Community College in Seattle, WA. To be held August 29-30, the seminar will feature leaders in the fields of dive safety, education and research. There will be pool demonstrations, exhibits, open water work and panel discussions. Many topics from personal limitations to promoting dive safety will be covered.

Combined with three prize drawings and the sixth annual Northwest Sea Story Telling Contest, this program will be one of the biggest and best dive events to take place in the Pacific Northwest this year. The program is open to all divers regardless of their certification level. The cost of the seminar is \$10 in advance and \$12 at the door. Contact: Walt Amidon, 1407 So. 118th, Tacoma, WA 98444. 🐟

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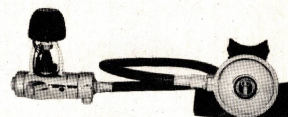
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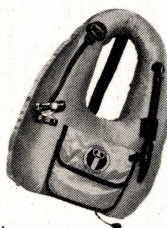
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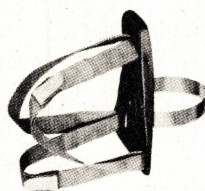


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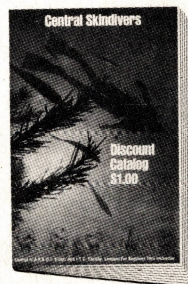


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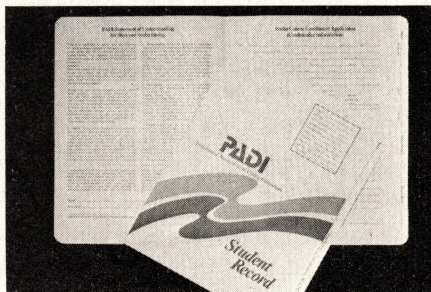
This September, four instructors from the U.S. Scuba Center in Pompton Plains, NJ will attempt to salvage an estimated \$4 million in cash, jewels, personal effects, vintage automobiles, china, silverware, art works and scrap metal, reported to have gone down with the Italian liner, *Andrea Doria*.

The divers, ranging in age from 26 to 51, hope to raise \$1.2 million from selected investors to finance the project. They spent last summer diving on wrecks along the New Jersey and Long Island coasts.

Sunday, July 26, was the 25th anniversary of the sinking of the *Andrea Doria* off Nantucket. She went down in 240 feet of water, 11 hours after being rammed by the *Stockholm*, a Swedish liner.

PADI STUDENT RECORD FOLDER

PADI has recently developed the student record folder. This practical file folder was designed as an organization-



al aid for dive instructors. Use of the student record folder reduces administrative paperwork while providing an easy access file for each student's quizzes and final exam answer sheet and other records.

Student record folders are available from PADI, 2064 N. Bush Street, Santa Ana, California 92706.

PADI ADVENTURES LOG

PADI announces the availability of its new Underwater Adventures Log Book. Designed for the many people taking resort or introductory scuba courses, the log provides important documentation of the dive experience, PADI headquarters verification, and a wealth of useful information.

A person taking part in an introductory scuba course purchases the log book, completes a special page with the instructor, and mails the page to PADI Headquarters. The participant is then registered in PADI's computer system (giving the instructor teaching credit) and a gold verification seal is sent back for placement in the student's adventure log.

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Name _____
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Mail to: NAUI HQ, P.O. Box 630,
Colton, CA 92324.

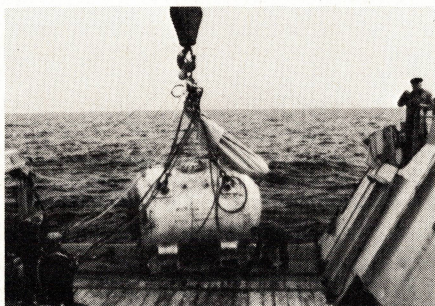
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After taking introductory scuba, those persons interested in full certification courses are referred to their local PADI Training Facilities by headquarters. To help this process, the log provides information on available PADI dive courses and the many ways to enjoy diving.

Divers, instructors and resort facilities interested in the Underwater Adventures Log should contact: PADI Headquarters, Dept. C, 2064 N. Bush Street, Santa Ana, CA 92706; (714) 953-7555.

LIFT BAGS

Lift bags manufactured by J. W. Automarine were instrumental in the recent salvage of four skid mounted chemical tanks containing aluminum alkali. The tanks, weighing ten tons each, were in 230 feet of water in the English Channel.



Steadfast Marine Inc., the salvage contractor, deployed TREC 12 (a remotely operated vehicle system fitted with a manipulator arm) to attach the lift bags. An array of bags of various sizes were used to achieve a controlled ascent for each tank to a point approximately 20 feet below the surface. From this position, divers were able to visually inspect the tanks to ensure their integrity. Finally, cables were attached and each tank was lifted clear of the water.

For further information on lift bags contact: James Mann, J. W. Automarine, One North Broadway, Suite 620, White Plains, New York 10601; (914) 682-8164.

USSC MEMBERSHIP

The United States Scuba Council is presently running a membership drive. The council, a not-for-profit organization, is dedicated to the sport diver. They run scheduled dive trips weekly, offer gear discounts, clinics, dives for all levels and various other activities. The United States Scuba Council is located in Chicago but serves divers throughout the nation.

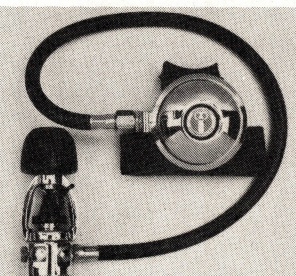
For further information write, USSC, Box 331, Downers Grove, IL 60313.

HALLOWEEN PARTY

On Saturday, October 17th, the Aqua Amigos Scuba Club will hold its 7th Annual Underwater Haunted House and Halloween Party at Nelson Ledges Quarry.

For further information contact Kim Wintle, the Aqua Amigos Scuba Club, Box 32004, Cleveland, OH 44132.

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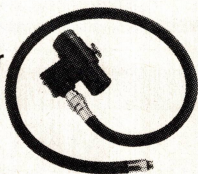
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9080-33 Sea Quest
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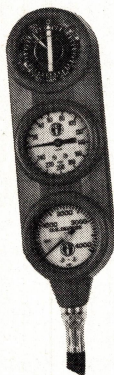
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Complete
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SUPER SPECIAL #3
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DIVER COURSE CONDENSED

Divers Academy of the Eastern Seaboard, Inc., of Camden, NJ has expanded its commercial diving program from 420 to 640 clock hours. This new 16 week program will offer additional training in saturation function and techniques, additional practical training in welding and burning, rigging, underwater television and video recording, rules of the road and other class projects.

The change from a six hour class day to an eight hour class day, will allow more efficient use of available training hours. Also, the six month course intensified into four months will save the student approximately two months of additional living expenses.

For further information about Divers Academy contact: Bill Brown, Director, Divers Academy of the Eastern Seaboard, Inc., 2500 S. Broadway, Camden, NJ 08104; (609) 966-1871.

UNDERWATER COMMUNICATION

Rosalyn International is offering courses in underwater acoustics. Topics include: regulator talking; sound localization; listening by bone conduction; and more. The full course is a four part self-study program designed for two divers. It includes complete information, illustrations, and all necessary materials.

For further information contact Rosalyn International, Inc., 1032 Morse Avenue, Schaumburg, IL 60193; telephone (312) 351-2202. (Enrollment is limited to certified divers.)

PADI COLLEGE WRECK/DEEP DIVER COURSE

The Second Annual PADI International College Wreck/Deep Diving Workshop for instructors and advanced divers will be conducted in Lake Superior (Munising, Michigan) August 27-31. This extension course offers certification as both deep and wreck diving specialists. Six boat dives on Lake Superior are included. Details may be obtained by contacting: Commander Jim Williams, President, PADI International College, 1310 Rosecrans, San Diego, CA 92106; (714) 223-9821.

SAN SALVADOR EXPANDS TIME-SHARE PROGRAM

Dick Batchelder, president of Columbus Landings Service Company, has announced plans for the expansion and development of the Time-Share Vacation Program at San Salvador Island in the Bahamas. Due to the immense popularity of

this program among vacationing scuba divers and dive shop owners, plans are being drawn up for the possible construction of 36 additional beachfront vacation villas which will be made available on a time-share purchase arrangement.

Joining the Columbus Landings management staff is Karen Kelsay, who will be serving as Time-Share Properties manager and co-hostess for this unique island dive resort. Working together with



Karen Kelsay

photo/Geri Murphy

Diane Narin, Karen will act as the resort's coordinator for non-scuba activities and time-share orientations. Karen is a graduate of Florida State University and has considerable experience in the area of real estate sales and properties management. Prior to her arrival at San Salvador, Karen worked in the St. Petersburg, Florida area for Equity Exchange Incorporated.

CARIBBEAN SCUBA VACATION

Join experienced scuba guide, Steve Weninger, on his 1981 trip to St. Thomas, U.S. Virgin Islands. The size of the group is limited so call or write today: Mr. Steve Weninger, c/o Aquarius Scuba Center, 20801 Highway 99, Lynnwood, WA 98036; (206) 776-7706.

SUNKEN SUBMARINE RESEARCH

Gisela Himmelseher, a West German journalist, is collecting information on a submarine which is rumored to rest on the ocean floor in the Strait of Bonifacio between Sardinia and Corsica. Research has indicated that members of the U.S. Navy, formerly stationed on Santo Stefano (an island off the northern Sardinian coast), had photographed the submarine.

The submarine in question could be of World War I or II vintage and anyone with information on it — especially members of the U.S. Navy — are asked to forward this information to Gisela Himmelseher, Everhardstr. 49, 5 Koln 30, West Germany.

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SPORTS Merchandisers is a **Price Buster!** Our warehouse stocks thousands of items for immediate shipment anywhere in the U.S. We sell only brand name merchandise in original boxes with guarantees from U.S. manufacturers, and will try to beat every price.

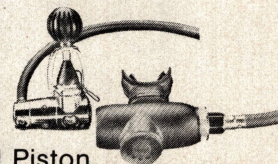
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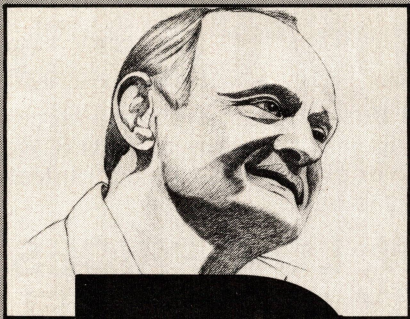
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RX FOR DIVERS

BY CHARLES V. BROWN, M.D.

R. Fowler of Alexandria, Louisiana would like a rundown on the problems a diver might encounter if he wears his contact lenses underwater.

Answer: Many divers wear regular hard contact lenses and have no problems. A few do have problems, which generally fall into one of three categories. The first is that if the mask floods or is lost in surf, the lens may wash out. This can be prevented by learning to squint at the critical moment.

The second problem is blurred vision due to corneal edema (excess fluid in corneal tissue), which may follow dives of sufficient depth and time — 60 feet for 30 minutes. The cornea is optically clear only if not water-logged. Water diffusing into it is constantly expelled by a metabolic pump which requires oxygen and glucose. These are supplied by the tear film flowing over the cornea. A contact lens may trap the tear film under it, stifling free flow. This limits the time that a

gives up and the cornea takes on water and loses its transparency. This phenomenon is probably related to the way the lens fits the eye's surface, since some divers experience it in one eye only, and others not at all. The visual blurring may last a half hour or more. A quick fix is to remove the contact lenses and get back into the ocean without your mask on. The high osmotic pressure of sea water quickly sucks the excess water out of the cornea.

The third problem is lens bends. Deeper and longer dives, usually requiring decompression, allow nitrogen entering the eye around the contact lens to diffuse into the cornea. The much shorter time of decompression isn't enough for the nitrogen to leave the way it came and the lens prevents its exit through the

hard contact lens can be worn, even when not diving. During a dive, excess nitrogen diffuses into the tear film beneath the lens and can't escape during the shorter time of ascent, so bubbles form beneath the lens. This further restricts tear flow. The starved water pump

corneal surface, so bubbles form within the cornea and blur the vision. They disappear within about two hours, apparently without harm. Both types of blurred vision can be prevented by wearing soft contact lenses, which are permeable to gases.

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California Skin Diving Schools
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(714)689-2422

Also, in San Bernadino, Pomona, Anaheim and Palm Springs.

(If you're not interested in relocating to Southern California, we are affiliated with other NASDS members in every state in this country as well as Canada and the Caribbean. They also need qualified people and we would be happy to refer you to them.)

This advertisement is placed by California Skin Diving Schools.

Question: Larry Fisk of Norfolk, Virginia had a cataract removed. His ophthalmologist has cleared him for all normal activities, but isn't sure about diving.

Answer: No problem — go ahead and dive. But wait a minute, contact lenses are often prescribed for people like you. If you do wear contacts, and any of the previously mentioned problems occur, check with an eye doctor who's into dive medicine — there are several remedies.

Question: About a year ago Everett Wellman of Oklahoma City learned that he had glaucoma. It's well controlled with eyedrops, and his vision is normal without glasses. He's 58 years old and in good health. Will diving be harmful to his eyes?

Answer: Glaucoma, a condition characterized by increased pressure within the eye, can destroy vision by compressing the blood vessels that serve the retina. By some estimates, one person in 80 has or will get glaucoma. Most cases can be controlled. Probably few divers have it, since it usually appears at an age when most people have given up diving or aren't about to start. We've seen no reports concerning the safety of diving with glaucoma, so can only speculate.

Ambient sea pressure is transmitted evenly through a diver's body. It doesn't alter the pressure differential between the inside and outside of the eye, so should have no effect on glaucoma. Conceivably

a severe mask squeeze pulling the eye forward could distort and partially block the ophthalmic vein, which would increase intra-ocular pressure. We doubt it, and anyway, mask squeeze is easily avoided. The vitreous fluid, which fills most of the eyeball, takes up nitrogen very slowly and wouldn't absorb significant amounts in the course of an ordinary sport dive. For these reasons, we believe it's OK for you to dive.

We can imagine a potential hazard in saturation diving, where the vitreous fluid would have time to load up with nitrogen. During decompression it would lose that nitrogen very slowly and would be more supersaturated than most other tissues. With nitrogen molecules more concentrated inside the eye than outside, the osmotic gradient would pull water in. Since the eye can't expand much, a small volume increase might raise the pressure considerably. The same would apply if any bubbles formed in the vitreous fluid.

Question: Coast Guardsman Jack Brenn, an experienced diver in good shape, decided he'd take Navy diver training and eventually go commercial. When his sickle cell test turned out to be positive they told him to forget it. Even sport diving, they said, could kill him.

Answer: Sickle cell disease is a congenital abnormality in which red blood cells distort into a sickle shape and clog up capillary beds, causing severe pain

and weakness. These abnormal cells break down easily, causing anemia. Sickling episodes occur when oxygen tension is low, and under other conditions not well understood. Diving is out.

However, based on the history you give, you probably don't have sickle cell disease but rather sickle cell trait, a milder condition. Your red cells aren't likely to sickle significantly unless the provocation is great. Running out of air without ready access to the surface might do it, but then sickling would be the least of your worries. If you've been diving a lot and never had a problem, we see no need to give it up now. It would be smart to check with a hematologist and find out exactly where you stand.

For military and commercial diving, hard and fast rules prevail, and sickle cell trait is generally considered disqualifying. We're not sure why. We've found nothing in the standard dive medicine texts to support such a hard line. Possibly the notion, like so many others, was first advanced as a theoretical possibility and simply copied by subsequent authors.

Question: A 43 year old denizen of Juneau, Alaska has been told to quit diving because of osteoarthritis in his hip joints. He bicycles, skis, and plays squash and racquetball without much discomfort, so questions the warning.

Answer: We're with you. Osteoarthritis is inexorable with age and may be aggra-

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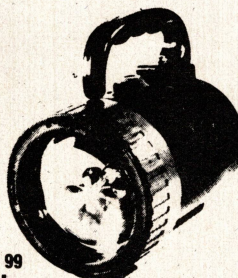
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vated by stress, but you're a bit young for serious symptoms. Moreover, immersion negates gravitational effects, so the stress on your hips when diving will be far less than when cavorting topside. If your hips are ailing, we'd say you should retire your bicycle and skis before your fins.

Question: A 29 year old diver who is very conservative about decompression has lately been getting pain and stiffness in his hands and neck. Activity aggravates it. Merely writing to us hurt — excruciating pain in his forefinger, especially when he straightened it out. X-rays showed an unspecified defect between the third and fourth cervical vertebrae. He wants to know whether this fits any known pattern of hyperbaric disorder, particularly dysbaric osteonecrosis.

Answer: We'd bet it's not dive related. It could be pinched nerves secondary to a collapsed cervical disc. If an orthopedist or neurosurgeon can't sort it out, have a rheumatologist check for an arthritic or connective tissue disorder.

Question: When Mr. B. took his basic diving course they did tank nursing — breath hold swimming between tanks stashed on the bottom. He had a problem with that and surfaced dizzy. It lasted only a few seconds. Much later he was hospitalized with schizophrenia and wonders if air embolism from the tank episode had something to do with it.

Answer: No way. Schizophrenia seems to be caused by a biochemical disorder, probably inherited. It has never been reported as a complication of air embolism. There are two ways to diagnose air embolism. The first is appearance of symptoms immediately after a dive and their resolution upon prompt recompression. The second is by autopsy. It's best not to dive until fully recovered. And be aware that medicines used to control schizophrenia may be hazardous to you underwater.

Question: Ken Glick of Forest Hills, New York, tells us that he has great difficulty in breathing at times, even though he's faithful with his regimen of asthmatic medications. He wants to know if it's OK to dive, what medicines he should avoid and how to find a doctor who can answer similar questions. The matter is fairly urgent, since he's newly certified and has already logged ten hours.

Answer: The authorities I know would be horrified. All agree that asthma and diving go together like gasoline and matches. Small airways narrowed by swelling, mucus and spasm may admit air into alveoli during the course of a dive, but won't let it escape fast enough during the much shorter time of ascent. You're courting lung over-pressure and air embolism.

The question of what medicines to avoid is moot if you accept immediate retirement from diving. If you're determined to push your luck, these strategies may stretch it. Beware of medicines such as ephedrine which stimulate the heart, since underwater they might predispose to dysrhythmias. Never dive when there's the slightest difficulty breathing. Make your ascents very slow, and always with normal breathing.

Finding a doctor qualified in dive medicine may not be easy. Ask at local dive shops and clubs.

SUBAWIDER

(Continued from Page 38)

2. The space between the Subawider II and the Nikonos lens must be flooded. When wiping bubbles from the lens surfaces, and pressing the Subawider II in place, make sure that your fingers aren't coated with silicone grease. Grease smears will show up in your pictures.

3. After swimming from one location to another, and before each group of shots, press the Subawider II back against the Nikonos lens mount to double check that it is seated squarely.

4. Because picture sharpness declines as you approach the near and far limits of depth of field, don't rely on zone focusing. For the sharpest pictures, set the focus for the estimated apparent distance to your primary subject. The focus scale is in meters, but you can safely think of meters as being yards.

5. Get close to your subjects. The most common mistake you will make when you first try wide-angle photography is to shoot from too far away. Fill the viewfinder!

6. Don't overlook close-up photography. Set the focus for 0.25 meters and hold the front of the lens about five or six inches from your subjects. Use strobe or lighting conditions that allow f16 or f22 exposures to maximize depth of field. A couple of rolls invested in wide-angle close-up experiments will teach you a lot.

CONCLUSIONS

The Subawider II takes surprisingly good pictures. Our tests with resolution charts show good picture sharpness in the central picture area. There is some barrel distortion and loss of sharpness in the corner areas, but the corners are rarely prominent in U/W wide-angle pictures. No, the Subawider II can't compete with the Nikonos 15mm lens, but it does an excellent job for the price — \$380, complete with viewfinder.

The Subawider II is manufactured in Switzerland by Subatec, and is distributed through professional dive shops in the U.S. by Farallon/Oceanic, 14275 Catalina Street, San Leandro, CA 94577. For more information, contact Farallon/Oceanic.

NEW PDSNY BUILDING

The new 8000 sq. ft. Professional Diving School of New York building, located at International Underwater Contractors' world headquarters in New York City, has been completed. Two large classrooms, shops, gas analysis room, lockers and shower area are now in use. One of the



main features is the school's new training tank. Fifteen feet in diameter by 14 feet deep, the tank features two, two by three foot viewing ports. Cutting and welding practice, non-destructive testing and underwater photography are courses for which the new tank will be extremely useful.

PDSNY also has a new training director, Gary Parsons. He is the former director of The Coastal Diving Academy in Bayshore, Long Island, NY. He has 12 years commercial dive experience and pioneered nuclear reactor diving. 🐠

IN-DEPTH DIVE SEMINARS

Multi-day, in-depth dive seminars are being conducted from Avalon on Santa Catalina Island this fall. Catalina Island is off the coast of Southern California and the seminars are being presented by Jon Hardy of Argo Diving Services. Hardy is well known in the dive community as a business and dive consultant, author, speaker, expert witness and professional with underwater instructor associations.

These seminars are intended for the serious or experienced diver, particularly the working diver or underwater instructor, but they are for all divers who wish an extensive dive experience to increase their practical diving knowledge and skills. During the five days of the seminar participants will make at least ten dives. Each dive is supported with lecture/discussion, AV materials, and printed materials on the practical aspects of that activity.

Complete detailed information is available from Jon Hardy, Argo Diving Services, P.O. Box 1201, Avalon, CA 90704; (213) 510-2208. 🐠

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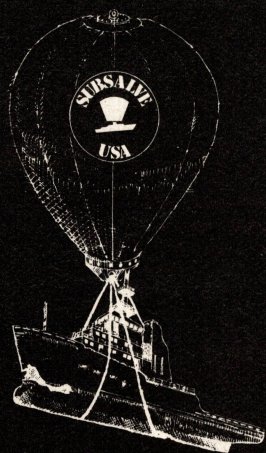
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Atlantis III

Atlantis III is the latest in a series of experimental deep dives in pressure chambers. These were designed to yield information as to how men may best be compressed to great depths and yet be fit, healthy and able to work efficiently.

An initial series of dives to 460 meters (1509 ft.) was planned to determine the value of trimix (nitrogen, helium, oxygen) in reducing signs and symptoms of High Pressure Nervous Syndrome (HPNS). HPNS presently limits the ability of man to

searchers hoped to obtain a depth a 650 meters (2132 ft.) by 1985.

ATLANTIS I

For Atlantis I, in April 1979, a dry dive to 460 meters (1509 ft.) using five percent nitrogen was performed with a remarkably fast compression time of 12 hours and 20 minutes (38 hours was the former record).

Although the three divers, Bud Shelton, Billy Bell and Len Whitlock were able to



photos/Stacey A. Tighe

The Atlantis III dive team consisted of (from left to right) Steve Porter, Len Whitlock, Maret Maxwell (an alternate) and Eric Kramer (below). The team reached a simulated depth of 2250 ft.

dive deeper than 300 meters (1000 ft.) without tremors, dizziness, nausea, vomiting, drowsiness, fatigue, brain wave and reflex irregularities and loss of motor control.

HPNS is the result of two factors, the effects of compression rate and the hydrostatic pressure on the nervous system. Work by Dr. Bennett, director of F. G. Hall Laboratory, in the early 1970's in the U.K. culminated in dives to 1000 feet that proved the addition of ten percent nitrogen to the helium-oxygen breathing mixture was very effective in controlling the incapacitating signs and symptoms of HPNS. The installation of chambers capable of simulating 3600 feet in 1977 permitted plans for further study of the use of trimix at depths greater than 1000 feet, with a series of deep dives called Atlantis.

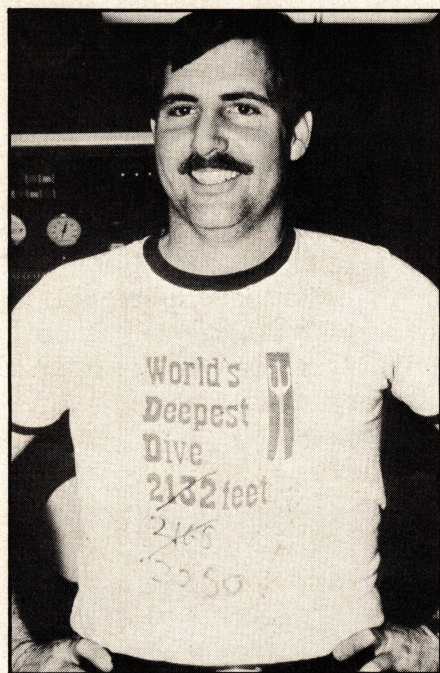
The dives in the deeper Atlantis series were planned to use one of two nitrogen percentages (i.e. 5 or 10 percent) and several rates of compression (e.g. 12, 24 or 48 hours to 1500 feet). However, only one parameter would be changed for each dive and efforts would be made to try to use a combination of new subjects and those from the previous dives. Re-

function very well after the second day of this especially fast compression rate, signs and symptoms of HPNS were clearly present. During compression, one diver vomited and fatigue and drowsiness were present. The performance tests showed a 40 to 50 percent decrement during, and soon after compression, which by the second day had decreased to 5 to 20 percent. This seemed mainly because the divers were working more slowly than before, as all tests were completed satisfactorily, including the very complex pulmonary function measurements, arterial catheterization, and blood gas sampling and analysis. Work-limiting dyspnea (a sense of air hunger or breathing through a straw) was present during moderate exercise but the arterial blood gases were within normal limits. Indeed, the dyspnea seemed worse when the subjects were required to breathe helium-oxygen alone rather than the denser trimix.

ATLANTIS II

Atlantis II, in March 1980, was also planned for 460 meters and used two of the same divers, Bud Shelton and Billy Bell, along with Steve Porter. In this case

Record 2250 feet



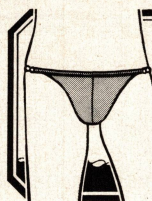
Success—Owen Doar wears a shirt on which each new depth record has been added.

a ten percent nitrogen mix was used. This proved very successful in controlling the debilitating effects of HPNS, and after six days the dive was extended to 650 meters (2132 ft.). Six months later in October, 1980 the British made a similar dive to 660 meters (2164 ft.) with ten percent trimix, but with especially rapid compression from 420 meters (1378 ft.), a rate some two and one-half times that of Atlantis II. This resulted in the two divers being incapacitated for 37 hours at 660 meters.

In Atlantis II, during the 24 hour stay at 650 meters, the subjects clearly demonstrated that it is possible to lead a normal existence without the effects of HPNS and to carry out complicated tasks requiring fine manual dexterity and moderately heavy work. However, the sensitive performance tests indicated the same 40 to 50 percent initial decrement as during Atlantis I. There is reason to believe — from other French and British dives — that much of this, certainly during and immediately after compression, is owing to the use of especially rapid compressions.

ATLANTIS III

Atlantis III took place in January-March 1981, with direct compression of three divers, Steve Porter, Len Whitlock and Eric Kramer. Compression to 650 meters took place over seven days, twice as slow as Atlantis II. The gas used throughout was ten percent nitrogen in helium-oxygen and the stay at 650 meters was four days. As in Atlantis II, this permitted a full series of psychological and neurophysiological performance and lung function tests in the resting and



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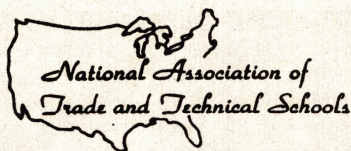


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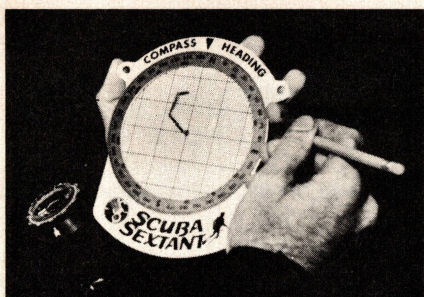
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ATLANTIS III

working diver, including venous blood and arterial blood gas sampling. After the four days the divers were compressed further to 686 meters (2250 ft.), where they spent 24 hours and carried out additional tests before beginning the long decompression.

The divers broke both depth and duration records and in fact spent 11 days at depths greater than 2000 feet (600 meters), seven days deeper than 2132 feet (650 meters) and one day at 2250 feet (686 meters). The trimix, as in Atlantis II, was very effective in preventing the adverse signs and symptoms of HPNS. Lung function studies showed that very hard work was possible at these pressures. The divers did not experience dyspnea (air hunger) at rest as in Atlantis II, but were obligated to breathe through their mouths.

One of the three divers appeared to get slightly less control of HPNS than the others. He experienced a mild increase in hand tremors with depth and mild increase in the slow waves of the electrical activity of his brain. However, the deeper the dive the better he became. The larger performance decrements on the first day of 460 meters were not seen with the slower compression of Atlantis III. However, these sensitive tests still showed much the same decrement in performance as for Atlantis I and II for a given stable depth, regardless of nitrogen percentage or rate of compression. This decrement for most tests was 15 to 20 percent and was at its maximum at 355 meters (1165 ft.) but no worse at 686 meters (2250 ft.). There did appear to be some difficulty with concentration at 2250 feet, which was identified by a greater decrement in arithmetic ability than the other tests. The divers did not sleep as effectively as usual which could also have contributed to the problem. However, in general the divers were in a fit condition and able to perform satisfactorily all the many tasks and research operations required of them. None of the adverse effects noted in the 1980 British dive were seen, which seems to confirm that these were owing to too rapid a compression with trimix.

During the decompression, two mild bends resulted, one at 528 meters (1733 ft.) and one at 515 meters (1690 ft.). These responded well to therapy, and with the decision to reduce the nitrogen in the trimix from this point to five percent at 1500 feet and zero percent at 1000 feet no further problems occurred. The divers surfaced healthy on Friday, March 6, but with the usual slight weakness seen after long saturation dives.

Analysis of the large volume of excellent scientific data is continuing. When

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this is complete and the results compared with Atlantis I and II, plans for Atlantis IV will be made for the fall of 1982.

Financial support for the dive was provided by the National Institute of Health, Heart, Lung and Blood Institute, the Bureau of Medicine and Surgery, U.S. Navy, Shell International and Oceaneering International, Inc. 

GIANT SLOTH

(Continued from Page 43)

plete animals, one for the local museum and one for Serbousek. He, Alexon and Hartman loaded their 3800 pounds of sloth bones into a truck and hauled them off to Canada.

The significance of the Daytona Beach Bone Bed can be appreciated from the fact that most animal skeletons on display at museums consist of 20 to 40 percent original bone. The Daytona museum's specimen is 90 percent original bone — Serbousek's is 80 percent original — and the Royal Ontario Museum has enough material for at least three more animals that will consist of about 50 percent original bones. In addition, Alexon has parts of skeletons of whole families of elephants ranging from juveniles to adults. Hartman also collected plant seeds, vegetation, rodents and other animal fossils that permit the giant sloth to be displayed in a natural setting.

The giant sloth is now on display at the Museum of Arts and Sciences in Daytona Beach. But the Royal Ontario Museum ran out of funds before Serbousek's specimen could be mounted and it was returned to him with the holes drilled and steel provided for assembly and erection. But Serbousek says, "This turned out to be a blessing in disguise." He explains that a mounted specimen containing original bones or plaster replicas must be displayed indoors, protected from the weather, and that they require a tremendous amount of expensive maintenance. He has teamed up with Dr. Cliff Jeremiah in Jacksonville, Florida who has developed a unique method of reproducing these fossils in fiberglass. The fiberglass replicas are virtually impervious to weather, can be mounted and displayed in the open, look exactly like the original fossils, and are lightweight. Thus, they are inexpensive to ship anywhere in the world. Serbousek and Jeremiah have formed a company, Florida Scientifics, Inc., which will make fiberglass reproductions of animal fossils for shipment around the world.

Serbousek is convinced that a wealth of unknown and unrecovered historical artifacts exist in ancient, drowned riverbeds on the ocean's continental shelf. He and Alexon are looking for financial backing to mount an exploratory expedition there — if the Florida Division of Archives and History will grant such permission to amateur archaeologists. 



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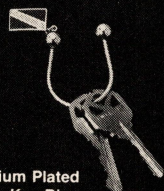
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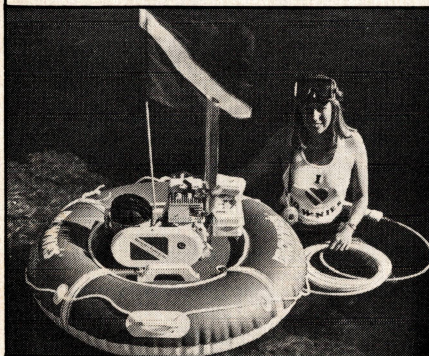
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SUBSEA SERVICE CENTERS

Subsea Products has opened a new factory authorized service center for all current production Subsea strobes. It offers full electronic repair as well as pressure test capabilities. Subsea Products feels that this will expedite prompt and efficient repairs for both its dealers and their customers.

The address of new factory authorized service center is: Subsea Products, Inc., Authorized Service Center, 617 North Orleans, Room 301, Chicago, Illinois 60610.

Subsea Products also has a service center available specifically for cables and connectors: Subsea Products, Inc., Connector Repair Center, 5111 Santa Fe Street, Suite H, San Diego, California 92045; (714) 272-2501.

Factory authorized service centers are also located at: 1006 West 15th Street, Riviera Beach, Florida 33404 — telephone (305) 844-0263; and 1010 Daisy Street, Escondido, California 92027 — telephone (714) 745-0720.

MARINE BIOLOGY COURSE

See & Sea Travel's new Marine Biology Afloat courses have been accredited by Florida International University. The courses are intensive introductions to coral reef biology offered aboard a fleet of live-aboard Caribbean dive boats.

1981 sessions for college credit will be held August 29-September 5 aboard the *Cayman Diver* and November 21-28 (Thanksgiving week) aboard the *Isla Mia* in Belize.

For further information contact See & Sea Travel.

NEW INSTRUCTORS

Divers Academy of the Eastern Seaboard, Camden, N.J., has added Thomas Missig and Thomas Darst to its teaching staff. Both instructors have extensive experience in commercial diving.

Missig, who received commercial diver training in 1976, has been employed around the world in oil fields, where he performed all phases of underwater work from inspection to hand jetting.

Thomas Darst is a certified professional deep sea diver with a background in marine biology and underwater photography. His experience in the Gulf of Mexico includes: inspection of rigs, pipelines and barges; body searches; wheel jobs; and engineering TV monitoring devices.

Divers Academy of the Eastern Seaboard offers a complete program for commercial diver training. Financial aid is available to qualified applicants. For further information contact Bill Brown, Director, Divers Academy of the Eastern Seaboard, 2500 Broadway, Camden, NJ 08104; (609) 966-1871.

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SELPAC DISTRIBUTOR OF THE YEAR

Selpac Southeast of Norcross, Georgia, has been named Scuba Distributor of the Year for 1980 by Sherwood Selpac Corporation, Lockport, New York. The



award was presented by Tim Borges, Sherwood Selpac president, and accepted by Pete Skop, president of Selpac Southeast.

Selpac Southeast is located at 6161 Atlantic Blvd., Norcross, Georgia 30071; phone (404) 449-4141.

MEDICAL ASPECTS OF DIVING

The NAUI Mid-Pacific Branch is sponsoring an underwater educational conference on New Medical Aspects of Diving at Fallen Leaf Lake, Tahoe, CA, September 11-13. The conference begins Friday evening at 7:00 pm with registration and dinner at the Stanford Sierra Lodge. This will be followed by opening ceremonies, lecture, and wine tasting.

Saturday morning's activities begin with guest speakers presenting various topics. Saturday afternoon, all conference divers are invited to participate in an experimental research dive in Fallen Leaf Lake, programmed to give a better understanding of bodily functions.

After dinner at the lodge, the program will continue with a film festival presented by an international cinematographer.

Sunday's events include panel discussions, final presentations, closing comments and lunch.

Space is limited, so make your reservations now. Conference fee: \$135 — diver, \$110 — non-diver. For information, call Nancy Guarascio at (415) 482-2326.

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AQUAVENTURE—1655 Oakton, Des Plaines, IL 297-7414
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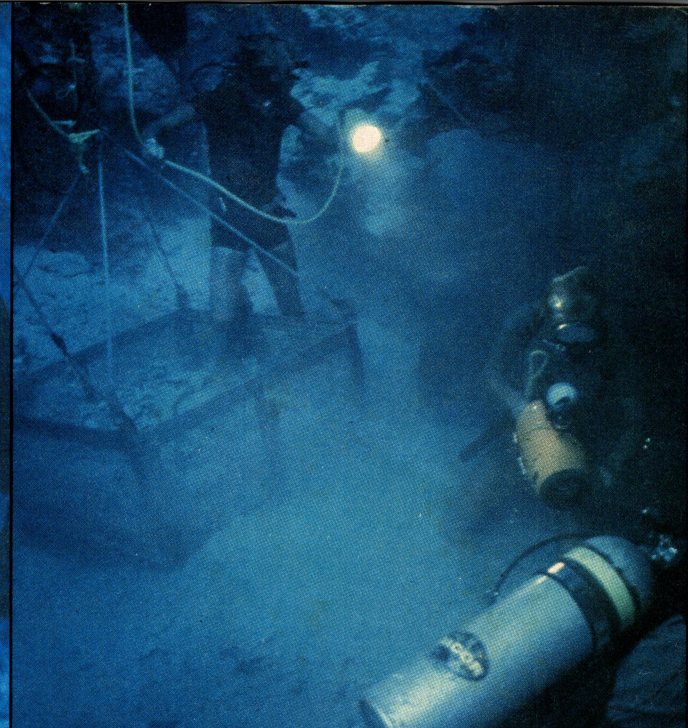
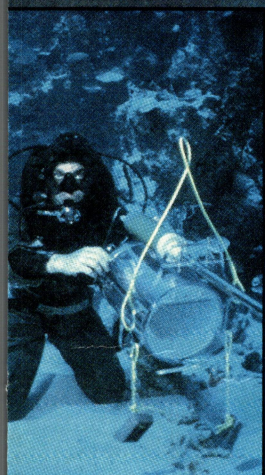
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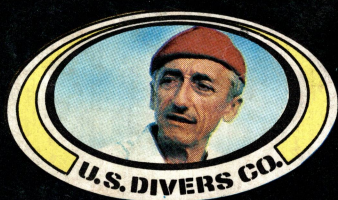
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